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No. 26



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USSR AND EASTERN EUROPE SCIENTIFIC ABSTRACTS

ENGINEERING AND EQUIPMENT

No. 26

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ENGINEERING
Acoustical & Ultrasonic

USSR

RYBAK, S. A.

NONLINEAR WAVES IN A LIQUID WITH GAS BUBBLES

SIMPOZ. PO FIZ. AKUST.-GIDRODINAM. YAVLENIY, SUKHUMI, 1975 in Russian
Moscow, Nauka Press 1975, pp 149-151

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No.
7B34 by A. K. Nikitin]

[Text] The author uses a system of nonlinear equations to describe the process of propagation of sound in a liquid with gas bubbles. Following the standard approach of the physics of nonlinear waves, he reduces the initial system to equations for slowly changing amplitudes

$$\frac{\partial c_k}{\partial t} = \sum_{k'} V_{kk'k''} c_{k'} c_{k''} e^{i(\omega_{k'} + \omega_{k''} - \omega_k)t}, \quad k'' = k - k'$$

where $V_{kk'k''}$ is the interaction potential, which can be represented as the sum of two terms $V_{kk'k''} = V_{kk'k''}^{(1)} + V_{kk'k''}^{(2)}$. The first reflects the nonlinearity

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USSR

RYBAK, S. A., SIMPOZ. PO FIZ. AKUST.-GIDRODINAM. YAVLENIY, SUKHUMI, 1975
pp 149-151

of the liquid, the second results from the presence of bubbles. Two cases are analyzed: 1) when the nonlinearity of the bubbles is predominant, while the frequency of the interacting waves does not exceed the resonant frequency of a bubble; 2) when the nonlinearity of the liquid is predominant. It is found that, by knowing the expression for the interaction potential, we can calculate the conditions of development of nonlinear effects upon propagation of sound. In particular, the nonlinear effects of distortion of the profile of an initially sinusoidal wave of amplitude V can appear if the condition $V/C_0 z > 1$ is fulfilled.

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USSR

KASOYEV, S. G.

THE RADIATION OF SOUND BY AN ELEMENTARY LINEAR VORTEX OVER A PLANE CONSISTING OF TWO THIN PLATES

TR. MOSK. FIZ.-TEKHN. IN-TA. SER. "OBSSHCH. I MOLEKULYAR. FIZ." in Russian 1975, No. 7 pp 42-47

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No. 7B267 by A. I. Ioffe]

[Text] A study is made of the radiation of sound by a linear vortex moving in a liquid over a flat boundary consisting of two semiinfinite plates with free edges; the vortex is parallel to the edges of the plates. The liquid is assumed to be slightly compressible. The problem is solved by the method of successive approximations; in determining the normal velocity of the boundary in solving the Neuman problem, it is considered that the plates are excited by a vortex moving along the rigid boundary and the corresponding expression is used for the potential. Subsequently, the method of intergrowth of asymptotic expansions is used. An analytic expression is used for the wave potential of the field excited by the vortex.

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USSR

UDC 681.327.2:621.373

VYOKHIN, V. N., KUROCHKIN, V. V.

PROBLEMS OF PROJECTION OF CONTROL SYSTEMS FOR AN ACOUSTICAL-OPTICAL DEFLECTOR

Novosibirsk AVTOMETRIYA in Russian No. 3, 1976 pp 35-41 manuscript received 14 Nov 75

[Abstract] Of two alternative methods of construction of discrete deflectors -- electric-optical and acoustical-optical -- the latter allows the creation of less expensive and smaller devices, since it requires only one or two deflecting elements for two-coordinate deflection. A study is made of the requirements which must be satisfied by a system for controlling an acoustical-optical deflector. The deflector is considered to operate as a hologram memory device. Various versions of realization of the control system are analyzed. A plan is described for a device to form the grid of frequencies based on quartz oscillators for operation as a part of a deflector with 32 x 32 positions. It is shown that such a frequency grid generator can be made of series 138 logic microcircuits, requiring no tuning and providing a frequency switching time on the order of 0.1 μ s.

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USSR

BARINOV, V. A., GEDYMIN, V. A., LEBEDEVA, O. V., PRINTSEV, B. K.

INFLUENCE OF ACOUSTICAL PERTURBATIONS ON PULSATION CHARACTERISTICS OF A JET AND THE TRANSITION OF A LAMINAR BOUNDARY LAYER TO A TURBULENT BOUNDARY LAYER

UCH. ZAP. TSENTR. AERO-GIDRODINAM. IN-TA in Russian 1976, Vol. 6 No. 6
pp 59-65

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No. 7B182 from the resume]

[Text] Results are presented from an experimental study of the influence of acoustical perturbations on the degree of turbulence of a stream in the gage portion of a wind tunnel and the position of the area of transition of the laminar boundary layer to a turbulent boundary layer. It is shown that the influence of artificially created perturbations is manifested at frequencies determined by the theory of hydrodynamic stability. 8 references.

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USSR

UDC 621.187.121

BLYANKMAN, L. M., Engineer, KOSTRIKIN, YU. M., Doctor of Technical Sciences and PASHKOV, S. I., Engineer, TSNIKIVR - VTI - Bobruysk Thermoelectric Power Plant-2

AN ULTRASONIC METHOD OF RECOVERING THE VOLUME CAPACITY OF IONITES

Moscow TEPLOENERGETIKA in Russian No 4, 1976 pp 74-78

[Abstract] The authors demonstrate that as a result of ultrasonic treatment of ionites operating for a long period of time their volume capacity increases by 2-3 times. The chemical structure of the ionite in this case does not change. They found that the spectra of an anionite, treated and not treated with ultrasound for 5 and 10 minutes at atmospheric and excess pressure are the same; there is no shift in the bands nor change in intensity of absorption. Neither does ultrasound touch upon the structure of the KU-2-8 cationite. Figures 2; tables 5; references 11: 10 Russian, 1 Western.

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USSR

DAIROV, A. A., KURMANGALIYEV, M. K., MENDEBAYEV, T. M.

APPLICATION OF ULTRASONIC OSCILLATIONS TO THE CUTTING ZONE DURING TURNING
OF THIN WALL ENVELOPES OF 1KH16N4B STAINLESS STEEL

MASHINOSTROYENIYE. VYP. .4 in Russian, Alma-Ata 1975, pp 8-13

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No.
7V388 from the Author Abstract]

[Text] Results are presented from studies involving application of tangential ultrasonic oscillations during turning of type 1KH16N4B stainless steel. Curves of distribution of circumferential residual stresses are defined. Using these curves, the optimal mode field is established.

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USSR

UDC 629.7.024: 539.4

BURMAN, M. I., and LUKASHENKO, V. I.

DEVELOPMENT OF METHODS OF MODIFYING THIN-WALLED REINFORCED SHELLS OF THE FUSELAGE TYPE AND COMPILING AN ALGORITHM FOR PRACTICAL DESIGN

Kazan' IZVESTIYA VUZOV AVIATSIONNAYA TEKHNICA in Russian
No 2, 76 pp 9-14 manuscript received 13 Dec 74

[Abstract] For modifying the structural elements of fuselages with respect to rigidity, the authors present a generalized method based on the use of the principle of overlapping the initial deformations onto the modified elements of the previously designed regularized system. This allows for successive modifications of the structures (particularly successive evolution of cut-outs). The necessary evidences of proof are given; an algorithm is derived, and the results of a fuselage design are presented. A comparison is made with the results of a detailed laboratory experiment. Ill 1 Bibl 8

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USSR

UDC 539.4: 629.7.02

VAKHITOV, M. B., and LARIONOV, N. G.

ANALYSIS THEORY OF THE SHORT WING ACCORDING TO A DISCRETE-CONTINUAL CALCULATION METHOD (NUMERICAL INTEGRATION OF THE EQUATIONS)

Kazan' IZVESTIYA VUZOV AVIATSIONNAYA TEKHNICA in Russian
No 2, 76 pp 15-20 manuscript received 30 May 74

[Abstract] This is a continuation of articles in earlier issues of this journal by the same authors, which treated the theory of calculating a wing of small elongation on the basis of a discrete-continual analysis method (IVUZOV AVIATSIONNAYA TEKHNICA, Nos 2, 4, 1975). Here the authors use an integrating matrix device to present a numerical solution of the closed system of differential equations obtained in the previous articles. The solution of the problem is reduced to the matrix equations relative to the values of the original unknowns in the design cross sections. Ill 1 Bibl 4

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USSR

UDC 629.7012

BOGOMOLOV, G. I.

VARIATION PROBLEM OF MINIMUM-DRAG BODY CONFIGURATION FOR GIVEN LENGTH AND VOLUME

Moscow IZVESTIYA VUZOV MASHINOSTROYENIYE in Russian No 7, 76
pp 89-91 manuscript received 27 Jan 76

[Abstract] For a given length and volume of a flying vehicle the author solves the variation problem of determining the configuration of a body with elliptical cross section having minimum drag at hypersonic velocities and zero angle of attack. Such an approach to the problem can arise during the general designing of a flight vehicle, since the requirement of allocating the payload, instrumentation, crew, etc., are nearly always accompanied by limitations on their various geometrical parameters, and the choice of elliptical cross section makes it necessary to achieve aerodynamic qualities greater than those of axially symmetrical bodies, which is of extreme importance in the case of guided vehicles.

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USSR

UDC 533

TRUNEVA, E. A.

ON THE MECHANISM OF STABILIZATION OF THE "POINT OF COLLAPSE" OF A VORTEX DURING A LOW-VELOCITY SUBSONIC FLOW AROUND A DELTA WING

Kazan' IZVESTIYA VUZOV AVIATSIONNAYA TEKHNIKA in Russian
No 2, 76 pp 106-110 manuscript received 13 Feb 75

[Abstract] On the assumption that the solution of the problem of the mechanism of vortex "collapse-point"-position stabilization affords a more generalized approach to the determination of the aerodynamic characteristics of an airfoil during flow separation and of the longitudinal and transverse stability of an aircraft, the author presents results of an experimental study of the mechanism of stabilization of the position of collapse points of vortices generated at the leading edge of a delta wing, beginning at the moment of collapse initiation. The experiments were conducted on three models of a delta wing with different angles of sweep. The results can be used in the analysis of nonstationary phenomena that occur in the case of delta wings during take-off and landing. Tab 1 Ill 4 Bibl 3

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USSR

UDC 629.73.05-52

SIRAZETDINOV, T.K., and KHALITOV, I. KH.

SELECTION OF WEIGHT COEFFICIENTS OF MINIMIZED INTEGRAL QUADRATIC FORM IN THE PROBLEM OF STABILIZING THE ROTATION OF ELASTIC AIRCRAFT

Kazan' IZVESTIYA VUZOV AVIATIONNAYA TEKHNIKA in Russian
No 2, 76 pp 101-105 manuscript received 28 Feb 75

[Abstract] A connection is established between the weight coefficients of the quadratic quality criterion and parameters of transient processes (relative damping factor and regulation time) of an elastic aircraft undergoing a rotational motion around the axis of symmetry. With certain assumptions regarding the weight functions of the optimized functional, the system is broken down into a set of isolated ordinary second-order differential equations, and the control actions of each harmonic are obtained independent of the other harmonics. The dependencies of the weight coefficients of the quality criterion on the time of transient process regulation are plotted on graphs.
Ill 1 Bibl 2

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USSR

MOLODOZHNIKOVA, R. N.

FLUTTER OF A CYLINDRICAL ENVELOPE WITH WAVES TRAVELING AROUND THE CIRCUMFERENCE

TR. MOSK. AVIATS. IN-TA in Russian 1975 No. 339 pp 93-101

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No. 7V471 by YU. N. Novichkov]

[Text] The stability of cylindrical circular envelopes of finite length in a supersonic stream of gas is studied in a nonlinear statement. The equations of Margerra are accepted as the initial equations. Aerodynamic forces are determined using a nonlinear version of the hypothesis of planar sections (piston theory). The solution is constructed by the Bubnov-Galerkin method with analysis of traveling waves in the circumferential direction. Analysis of this type of instability is in agreement with the results of experimental investigations of the flutter of circular cylindrical envelopes published in the literature. As a result of the solution of the nonlinear problem in this work the existence of flutter modes at velocities less than the critical velocities defined by linear theory is confirmed.

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USSR

BARANOV, N. I., KOMAROV, A. I., MAKHLIN, I. M., PONOMAREV, YU. V.,
STRELKOV, S. P.

THE INFLUENCE OF RIGIDITY OF ATTACHMENT OF A WING ON STABILITY OF AEROELASTIC
OSCILLATIONS

UCH. ZAP. TSENTR. AERO-GIDRODINAM. IN-TA in Russian 1975, Vol. 6 No. 6
pp 82-88

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No.
7V469 from the resume]

[Text] The stability of elastic oscillations of a delta wing in an airstream is studied as a function of the rigidity of attachment of the wing to the fuselage. Consideration of the oscillations of the wing in the horizontal plane leads to the appearance of one more area of instability. The study of the stability of distributed systems is reduced to analysis of the spectrum of natural values of the corresponding edge problem. The edge problem is solved using a fundamental system of partial solutions.

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USSR

RYLOV, A. I.

NUMERICAL ANALYSIS OF CERTAIN SUPERSONIC ASYMMETRICAL NOZZLES

AEROFIZ. ISSLEDOVANIYA. VYP. 5 in Russian, Novosibirsk 1975, pp 204-206

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No.
7B1152 by N. A. Kolesnikova]

[Text] The parameters of three supersonic asymmetrical flat nozzles are calculated in order to estimate their optimal geometric and thrust characteristics. A study is made of the isentropic flow, even and horizontal at the inlet and outlet with Mach numbers M_1 and M_2 respectively ($M_2 > M_1 > 1$). The calculation is performed by the method of characteristics. Some 170 points were fixed in the initial characteristic, the pressure force integrals were calculated using the formula of Simpson, assuring high accuracy of calculation. Based on the data produced, a comparison is presented of the characteristics of the nozzles and recommendations given for their application. 6 references.

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USSR

BYCHKOV, N. M., SULEYMANOV, SH.

RESULTS OF MEASUREMENT OF LATERAL FORCES ON ROTATING ELONGATED MODELS WITH VERY HIGH ANGLES OF ATTACK

AEROFIZ. ISSLEDOVANIYA. VYP. 5 in Russian, Novosibirsk 1975, pp 141-143

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No. 7B1144 by A. I. Kharitonov]

[Text] Measurements of lateral forces and their moments on rotating finned and unfinned models with $\lambda = 18-14$ are measured. A stream with a velocity $U_{\infty} = 15-80$ m/sec was created in a T-324 wind tunnel, the angle of attack of the models was varied from 40 to 90° . Based on the experimental results produced, the influence of angle of attack, Reynolds number, rotation parameter and geometry of the body on the change in lateral forces is estimated.

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USSR

VEDERNIKOV, YU. A.

THE GENERALIZED PROBLEM OF OPTIMIZATION OF SEMI-WEDGE NOSE SECTIONS

AEROFIZ. ISSLEDOVANIYA. VYP. 4 in Russian, Novosibirsk 1975, pp 166-169

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No. 7B1142 by V. I. Kholyavko]

[Text] The integral of resistance of three and four-wedge (pyramidal) bodies with curved external and internal ribs is minimized using the hypersonic theory of Newton considering forces of friction. The influence of span is analyzed and a comparison is presented with cones equivalent in length and base diameter and bodies of rotation equivalent in transverse cross-sectional area. Experimental data are presented for a four-wedge body with straight external and internal ribs. It is shown that these bodies at $M > 5$ have lower resistance than equivalent bodies of rotation. It is noted that considering the thickness of the edges, the gain in the drag of polyclinic bodies is decreased. 6 references.

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USSR

AZIMOV, A. A., NARMETOV, T. M.

STUDY OF THE DYNAMICS OF A LOAD TRANSPORTED BY HANGING FROM A HELICOPTER
IN THE HORIZONTAL FLIGHT MODE

SEYSMOSTOYKOST'PODZEM. SOORUZH. I NATURN. ISSLED. ZDANIY in Russian
Tashkent Fan Press 1976, pp 89-97

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No.
7B1137 by the authors]

[Text] Equations of motion are produced and studied for a load transported suspended from a helicopter in horizontal flight. Based on analysis of the equations of motion of the load and the results of model and natural experiments, the interrelationship between the basic parameters of stability is determined: length of external support line and ratio of cross section of load to its weight. The area of transverse and longitudinal stability of a nonstreamlined load transported by suspension from a helicopter in horizontal flight is determined.

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USSR

VOROTNIKOV, YA. V.

INFLUENCE OF EARLY RAISING OF FLAPS ON IMPROVEMENT OF CHARACTERISTICS OF
INITIAL CLIMB

SB. NAUCH. TR. TASHKENT. POLITEKHN. IN-T in Russian 1975, No. 154 pp 23-30

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No.
7B1131 by G. S. Aronin]

[Text] An estimate is made of the possibility of using early beginning of raising of flaps after separation during takeoff in order to reduce the takeoff distance of an aircraft. It is assumed that the selection of the flap raising mode and climbing mode must provide compensation for the losses in lift by an increase in velocity head while retaining the separation reserve and maintaining flight safety in case of possible imbalance in the raising of the flaps. The possibility is shown in principle of takeoff with early raising of flaps by mechanization at a slow rate, which can be looked upon as a reserve for partial improvement of the takeoff characteristics of the aircraft.

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USSR

VOLKOV. V. F., CHERKASHENKO, V. F., YUDINTSEV. YU. N.

AZIMUTHAL DISTRIBUTION OF INTENSITY OF THE HEAD JUMP BENEATH A LOAD-BEARING
DELTA WING

AEROFIZ. ISSLEDOVANIYA. VYP 5 in Russian, Novosibirsk 1975, pp 186-189

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No.
7B1105 by V. I. Khol'yavko]

[Text] Results are presented from experimental studies of the field of excess pressure over a thin delta wing ($\chi = 70^\circ$) at $M \approx 2$ and various angles of attack ($0 - 5^\circ$). The pressure was measured by a probe in planes fixed by the azimuthal angle (angle of inclination of plane passing through probe and tip of wing to plane of symmetry of wing). Using the method of equivalent bodies of rotation, the results of experimental investigations were extrapolated to the distant wake, in which analysis of the asymptotic flow picture is given. 5 references.

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USSR

UDC 62. 50

MESHCHANOV, A. A.

ON MODES OF MOTION OF SYSTEMS WITH DISCONTINUITY OF CONTROL ON
TWO HYPERPLANES

Kazan' Izvestiya VUZOV AVIATSIONNAYA TEKHNIKA in Russian
No 2, 76 pp 61-67 manuscript received 31 Jan 75

[Abstract] Whereas the problems of stabilizing the motion of flight vehicles and of regulating the rpm of gas turbine power plants, etc., are best solved as systems of motion with variable, rather than linear, structure, the distinguishing feature of control proposed by the author in an earlier work (TRUDY KAZAN'-SKOY AVIATSIONNOY INSTITUTA, No 187, 1975) is the presence of only two specially selected switching hyperplanes, and a discontinuity of control on both hyperplanes, which affords additional possibilities in the organization and study of modes of motion in systems of variable structure. Here the behavior of a stationary object is considered. The problem involves the selection of two vectors plus the control vector in such a way that the zero solution of the system will be asymptotically stable over all, and the modes of motion will have the desired dynamic properties. Bibl 8

USSR

KOKOSHINSKAYA, N. S.

THE FLOW OF A VISCOUS GAS IN A WAKE BEHIND A BLUNT BODY

TR. V VSES. SEMINARA PO CHISL. METODAM MEKH. VYAZKOY ZHIDKOSTI. CH. 2
in Russian, Novosibirsk 1975, pp 106-118

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No.
7B63 by V. S. Galkin]

[Text] A study is made of the flow in a laminar wake behind a spherically blunted cone at 0 angle of attack with high Reynolds numbers Re . The zone of perturbed flow between the axis of symmetry and the head compression jump is divided into three intersecting areas. Area I includes the portion of the flow over the cone (upstream from the bottom section), the bottom area and the neck of the wake, area II -- the portion of the neck of the wake and the area beyond the neck, on the axis of symmetry of which a subsonic velocity obtains, area III is located beyond the neck of the wake and is selected so that the flow in it is fully supersonic. In areas I

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USSR

KOKOSHINSKAYA, N. A., TR. V. VSES. SEMINARA PO CHISL. METODAM MEKH.
VYAZKOY ZHIDKOSTI. CH. 2 1975, pp 106-118

and II, the method of settings is used to find the stable solution to the nonstationary Navier-Stokes equations (in a cylindrical system of coordinates), using an explicit difference plan of second order accuracy with respect to coordinates in combination with an interrational process and smoothing of the profile of the gas dynamic parameters f_i in each time layer with respect to x , then with respect to r . In area III, the author finds the solution of the simplified (longitudinal gradients f_i small in comparison with the transverse gradients) stable solutions of the Navier-Stokes equations, using an implicit difference plan with second order accuracy with respect to r and first order accuracy with respect to x and matrix run-through. On the wall, he uses the condition of attachment, at the jump -- nonstable (I, II as well as additional condition for density $\partial^2 \rho / \partial r^2 = 0$)

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USSR

KOKOSHINSKAYA, N. A., TR. V. VSES. SEMINARA PO CHISL. METODAM MEKH.
VYAZKOY ZHIDKOSTI. CH. 2 1975, pp 106-118

and stationary (III) Rankin-Hugoniot conditions. At the rear (downstream) boundaries of areas I, II, "soft" boundary conditions are created $\partial^2 f_i / \partial x^2 = 0$. The values on the upstream boundary of area I are taken from the solution of the problem of flow around a cone by a viscous gas with high Re . The positions of the forward boundaries in II, III are selected within I, II respectively from the conditions of minimization of the influence of "soft" boundary conditions. In order to study the influence of expansion at the corner point ($x=0$) upstream and the acceleration of the count, area I is divided into two subareas, adjacent to the jump and at the base of the cone respectively. On six figures, results are presented (flow picture and certain profiles f_i) from calculations of the flow in the wake beyond the cone with a half aperture angle of 10° where $M_\infty = 15$ and $Re_\infty = 1.3 \cdot 10^4$ (the latter was calculated from the radius of the base of the cone H). The boundaries of the areas are located respectively where $\xi = x/H = (-1, 2.2), (1.5, 4.9), (4.5)$, calculation is continued to $\xi = 50$. The influence of expansion at the corner point extends downstream to $\xi = -0.6$, while where $x = 0$ to $\eta \equiv r/H \approx 1.2$. The point of separation is found

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USSR

KOKOSHINSKAYA, N. A., TR. V. VSES. SEMINARA PO CHISL. METODAM MEKH.
VYAZKOY ZHIDKOSTI. CH. 2 1975, pp 106-118

significantly below the corner point (where $\eta = 0.87$), the coordinate of the rear critical point $\xi = 1.27$. The line $M=1$ intersects the axis where $\xi = 4.4$. Where $\xi = 50$ on the axis $p/p_\infty = 0.966$, $T/T_\infty = 10.83$.

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USSR

GOGISH, L. V., STEPANOV, G. YU.

THE TURBULENT WAKE BEYOND A CONE IN SUPERSONIC AND HYPERSONIC STREAMS

NAUCH. TR. IN-T MEKH. MOSK. UN-TA in Russian 1975, No. 39 pp 127-144

[Translated from REFERATIVNYY ZHURNAL MEKHANIKI No. 7, 1976 Abstract No. 7B234 by YA. G. Sapunkov]

[Text] An integral method is used to calculate the flow in the wake beyond a cone. The entire flow beyond the cone is divided into the flow in the bottom area, the near wake and the far wake. The solutions produced in each area are meshed using integral conditions of conservation for a turbulent stream and a three-layer nonviscous stream, consisting of a layer of influence, an antropy layer and the unperturbed flow. The solutions produced for all three areas include one empirical constant in each area, the value of which in each area is selected from the condition of best matching of calculation data to experimental data. The influence of blunting of the cone on the flow in the turbulent wake is studied. It is noted that the integral method and the method of finite differences

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USSR

GOGISH, L. V., STEPANOV, G. YU., NAUCH. TR. IN-T MEKH. MOSK. UN-TA 1975 No. 39 pp 127-144

provide identical calculation accuracy for the solution of this problem. Furthermore, the problem is solved of determining the position and dimensions of a moving body based on the results of measurement of velocity in the far wake. 15 references.

2/2

USSR

KOVALENKO, V. M., SULEYMANOV, SH.

FLOW RESISTANCE OF A SMOOTH PLATE AND A PLATE WITH AN INDIVIDUAL IRREGULARITY
IN A CLOSE AERODYNAMIC WAKE

AEROFIZ. ISSLEDOVANIYA. VYP. 5 in Russian, Novosibirsk 1975 pp 140-141

[Translated from REFERATIVNYY ZHURNAL MEKHANIKI No. 7, 1976 Abstract No.
7B1256 by A. I. Kharitonov]

[Text] Experiments are conducted in the T-325 wind tunnel of ITPM Institute at $M = 0.79$ ($Re = 5.7 \cdot 10^4$) and $M = 2.45$ ($Re = 9.8 \cdot 10^4$) to study the influence of perturbations created by certain obstacles on the local friction drag of a smooth plate and the resistance of an individual irregularity made in the form of an applied sheet 0.1-0.7 mm thick. The forces were measured by an electromagnetic balance, the characteristics of the boundary layer were determined by means of a full pressure microhead. The error in determination of the local friction factor was 2-3%, of the drag factor of the individual irregularity -- 12%. It was experimentally shown that changes in the

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USSR

KOVALENKO, V. M., SULEYMANOV, SH., AEROFIZ. ISSLEDOVANIYA. VYP. 5 1975,
pp 140-141

coefficients are determined by the distance from the source of the perturbation, shape and dimensions of the perturbing obstacle, as well as the height of the irregularity.

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USSR

UDC 629.78.015:532.526

FILIPPOV, V.M.

EXPERIMENTAL RESEARCH IN THE EFFECT OF A PRESSURE GRADIENT ON THE
TRANSITION OF A LAMINAR BOUNDARY LAYER INTO A TURBULENT ONE

UCHENYYE ZAPISKI TSENTRAL'NOGO AEROGIDRODINAMICHESKOGO INSTITUTA
[Scientific Notes From the Central Institute of Aerohydrodynamics] in
Russian, Vol 6 No 6, 1975 pp 114-118

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No 7 1976 Abstract No
7.41.96 (resume)]

[Text] The author presents the results of an experimental investigation of the effect of a pressure gradient on the transition of a laminar boundary layer into a turbulent one. The investigations were carried out in a low-turbulence, incompressible flow on a plane plate. The results of the experiments to determine the pressure gradient's effect agree quite well with the results of calculations made according to the semiempirical theory and confirm previously obtained data on the transition of a laminar boundary layer into a turbulent one on profiles tested under flying conditions and in wind tunnels with a
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USSR

FILIPPOV, V.M., UCHENYYE ZAPISKI TSENTRAL'NOGO AEROGIDRODINAMICHESKOGO INSTITUTA, Vol 6 No 6, 1975 pp 114-118

comparatively high degree of flow turbulence. The author measured the statistical characteristics of the boundary layer over its entire length in the transition area. He also describes the methods and material used in the experiments. Figures 4; references 10.

USSR

UDC 629.78.018.1

BOSHENYATOV, B.V., DRUKER, I.G., TREYER, L.YA., and YAROSLAVTSEV, M.I.

RESEARCH IN THE EFFECT OF DISTRIBUTED INJECTION ON THERMAL FLOWS AT THE CRITICAL POINT OF A SPHERE AT HYPERSONIC SPEEDS

Novosibirsk AEROFIZICHESKIYE ISSLEDOVANIYA [Aerophysical Research, Collection of Works] in Russian, No 5, 1975 p 244; see also same authors, IZVESTIYA AN SSSR. MEKhanika ZHIDKOSTI I GAZA [Bulletin of the USSR Academy of Sciences, Fluid Mechanics] in Russian, No 1, 1976 pp 176-180

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No 7 1976 Abstracts No 7.41.108-7.41.109 (resume)]

[Text] The authors investigate the effect of a distributed injection of a cooling gas on heat transfer to bodies with a spherical bluntness in a hypersonic, high-enthalpy flow when the value of the temperature factor is close to natural. The experiments were conducted in the pulse wind tunnel IT - 301 the operating time of which is ~ 60 msec at Mach 13.7. The models were a hemisphere-cylinder combination with ratio $L/D = 1$ and nose curvature $1/3$

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USSR

BOSHENYATOV, B.V., DRUKER, I.G., et al., AEROFIZICHESKIYE ISSLEDOVANIYA, No 5, 1975 p 244; IZVESTIYA AN SSSR. MEKhanika ZHIDKOSTI I GAZA, No 1, 1976 pp 176-180

radii $R_1 = 50$ mm and $R_2 = 30$ mm. The cooling gas is blown in through a porous wall in the vicinity of the critical point. The area of the distributed injection was 2.39 cm^2 . The proposed technique makes it possible to reliably determine the mass flow rate of the injected gas at any moment of operation of the wind tunnel that is characterized by a constant Mach number and a decrease in the braking parameters: $P_{of} = (705 + 113) \text{ kg/cm}^2$, $T_{of} = (2,350 + 1,550)^\circ\text{K}$, $Re = (5 + 1.5) \cdot 10^6/\text{m}$. In addition, during each experiment the authors measured the heat flow at the critical point, braking pressure $P_{of}(t)$, and pressure behind the direct jump $P_0'(t)$ (in order to monitor the tunnel's performance), and also made a high-speed moving picture film of the shadow pattern of the model's flow-past. The injected gas's (nitrogen) flow rate varied within the limits $(5-22) \cdot 10^{-3} \text{ g/cm}^2$. The gas temperature was 2900°K . Under these circumstances, the ratio of the value of the heat flow at the critical point with injection to that of the heat flow without injection changed from 1 to 0.185 when the relative injection of cooling any (v_{in}) changed from 0 to 0.027. The experimental data that were obtained, which correspond to any moment of

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USSR

BOSHENYATOV, B.V., DRUKER, I.G., et al., AEROFIZICHESKIYE ISSLEDOVANIYA, No 5, 1975 p 244; IZVESTIYA AN SSSR. MEKHANIKA ZHIDKOSTI I GAZA, No 1, 1976 pp 176-180

wind tunnel operation, agree with the numerical calculations within the limits of measurement error, which indicates that the investigated phenomenon is quasistationary and confirms the reliability of the results of this type of investigation in pulse wind tunnels. References 1.

3/3

USSR

UDC 629.7.036.3:533.647.2

ZARYANKIN, A.YE., and BARANOVSKIY, B.V.

ON CALCULATING LOSSES IN A DUCT WITH A NONUNIFORM INPUT VELOCITY PROFILE

Moscow TRUDY MOSKOVSKOGO ENERGETICHESKOGO INSTITUTA [Works of the Moscow Power Engineering Institute] in Russian No 273, 1975 pp 27-35

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 2 1976 Abstract No 2.34.87 (resume)]

[Text] When evaluating the effect of an input irregularity on losses in diffusors, earlier investigators pointed out the conservative nature of the area near the wall, and on this basis proposed that the solution be formulated as the superposition of two solutions: one being a real one near the wall and an ideal one in the nucleus; the other being an ideal one near the wall and a real one in the nucleus. In this article the authors show that in the final account, such an approach yields a satisfactory solution to the formulated problem for practically any class of input irregularity. Figures 3; references 8.

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USSR

UDC 629.7.036.3:533.6.013.12

KOSTERIN, V.A., DUDIN, L.A., MOTYLINSKIY, I.P., ROGOZHIN, B.A., and KHISMATULLIN, A.YA.

EVALUATING THE HYDRAULIC RESISTANCE OF JET-TYPE FLAME HOLDERS

Kazan' TRUDY KAZANSKOGO AVIATIONNOGO INSTITUTA [Works of the Kazan' Aviation Institute] in Russian, No 182, 1975 pp 38-43

[From REFERATIVNYY ZHURNAL, AVIATIONNOYE I RAKETNOYE DVIGATELI No 3 1976 Abstract No 3.34.20 (resume)]

[Text] The authors present the results of their experimental investigation of the hydraulic resistance of jet-type flame holders. They show that in order to evaluate the hydraulic resistance correctly, it is necessary to allow for the energy contributed by the stabilizing jet. They propose formulas for determining the coefficient of hydraulic resistance of jet-type flame holders. Figures 4; references 4.

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USSR

UDC 629.7.036.3:621.43.056

PODSHIVALIN, A.V., MOTYLINSKIY, I.P., and SPIRIDONOV, YU.A.

MIXING OF A SYSTEM OF LATERAL JETS WITH AN AXIALLY SYMMETRIC DRIFTING FLOW

Kazan' TRUDY KAZANSKOGO AVIATIONNOGO INSTITUTA [Works of the Kazan' Aviation Institute] in Russian, No 182, 1975 pp 33-38

[From REFERATIVNYY ZHURNAL, AVIATIONNOYE I RAKETNOYE DVIGATELI No 3 1976 Abstract No 3.34.21]

[Text] The authors present the results of an experimental investigation of the mixing of a system of lateral jets with an axially symmetric drifting flow over a wide range of conditions and structural parameters. They generalize the obtained temperature fields as a function of the relative striking range of the jet's temperature axis. Figures 4; references 7.

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USSR

UDC 533.601.1.533+607.14

MUSIN, L.R., YANKOVSKIY, V.M., and POSTNOV, V.F.

EFFECT OF THE STABILIZER'S SIZE AND SHAPE ON THE PARAMETERS OF TURBULENCE IN A CLOSED FLOW

Kazan' TRUDY KAZANSKOGO AVIATSIONNOGO INSTITUTA [Works of the Kazan' Aviation Institute] in Russian, No 184, 1975 pp 29-35

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 3 1976 Abstract No 3.34.19 (resume)]

[Text] The authors conducted an experimental investigation of the components of the pulsation components of a turbulent flow's velocity and their intensities (transverse and longitudinal) in an axially symmetric duct 150 mm in diameter. The experiments were conducted with the level of turbulence at that encountered in a smooth duct and with the insertion of two orthogonal grids with rod diameter and cell size of 4 and 15 mm, respectively. The parameters of the flow's turbulence were measured behind stabilizers in various shapes (disk, cone, cylinder) and sizes (cone diameters of 60, 85, and 100 mm), for different levels of turbulence in the flow striking the stabilizer.
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USSR

MUSIN, L.R., et al., TRUDY KAZANSKOGO AVIATSIONNOGO INSTITUTA, No 184, 1975 pp 29-35

The authors establish that the characteristics of the flow's turbulence behind stabilizers of different shapes and sizes do not possess the property of additivity with respect to the turbulent characteristics of the flow that strikes the stabilizer. Figures 10; references 4.

USSR

UDC 627.7.036.3:533.6.011

ZHADIN, I.G.

INVESTIGATION OF THE MIXING PROCESSES IN INTERMINGLED COAXIAL FLOWS
MOVING AT THE SAME SPEED

Kazan' TRUDY KAZANSKOGO AVIATIONNOGO INSTITUTA [Works of the Kazan' Aviation Institute] in Russian, No 183, 1975 pp 45-49

[From REFERATIVNYY ZHURNAL, AVIATIONNYYE I RAKETNYYE DVIGATELI No 3 1976 Abstract No 3.34.8 (resume)]

[Text] The author presents the results of an experimental investigation of the initial section during the mixing of intermingled, coaxial, isothermic flows with a variable initial level of turbulence intensity. He shows that under certain conditions, the size of the outer flow's duct has a considerable effect on the mixing process. He also establishes that changing the initial intensity of both flows' turbulence affects the basic parameters characterizing the mixing process. Figures 6; references 5.

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USSR

UDC 629.7.036.3:533.6

KNYSH, YU.A., and LUKACHEV, S.V.

ON THE MECHANISM OF INSTABILITY OF TWISTED LIQUID AND GAS FLOWS IN
THE ELEMENTS OF A GAS-TURBINE ENGINE

Kuybyshev TRUDY KUYBYSHEVSKOGO AVIATIONNOGO INSTITUTA [Works of the Kuybyshev Aviation Institute] in Russian, No 67, 1976 pp 205-208

[From REFERATIVNYY ZHURNAL, AVIATIONNYYE I RAKETNYYE DVIGATELI No 3 1976 Abstract No 3.34.9]

[Text] The authors suggest a mechanism for the excitation of natural vibrations in twisted liquid and gas flows. They describe the results of their experimental investigation of the instability of the current of twisted liquid flows, and derive a formula for determining the frequency of the vibration process. Figures 1; references 1.

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USSR

UDC 532.5

KACHANOV, YU.S., KOZLOV, V.V., and LEVCHENKO, V.YA.

DEVELOPMENT OF LOW-AMPLITUDE OSCILLATIONS IN A LAMINAR BOUNDARY LAYER

UCHENYYE ZAPISKI TSENTRAL'NOGO AEROGIDRODINAMICHESKOGO INSTITUTA

[Scientific Notes From the Central Institute of Aerohydrodynamics] in Russian, Vol 6 No 5, 1975 pp 137-140

[From REFERATIVNYY ZHURNAL, AVIATIONNYYE I RAKETNYYE DVIGATELI No 3 1976 Abstract No 3.34.6 (resume)]

[Text] The authors conducted an experimental investigation of the stability characteristics of a laminar boundary layer on a flat plate, for the purpose of determining the role of slight nonparallelism of the current. The results they obtained indicate that nonparallelism has a substantial influence on the pattern of disturbance development. This effect results in a strong dependence of the disturbance growth rates on the distance to the wall, distortion of the disturbances' transverse profile, stratification of the neutral stability curve, and the formation of an area of partial instability. Figures 4; references 8.

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USSR

UDC 533.06.011

SALAMASHKIN, V.A.

ON SOME SPECIAL FEATURES OF A CURRENT IN A DUCT WITH A COMPLEX SHAPE

Kazan' TRUDY KAZANSKOGO AVIATIONNOGO INSTITUTA [Works of the Kazan' Aviation Institute] in Russian, No 184, 1975 pp 36-40

[From REFERATIVNYY ZHURNAL, AVIATIONNYYE I RAKETNYYE DVIGATELI No 3 1976 Abstract No 3.34.7 (resume)]

[Text] The author discusses the features of a current in the duct of a throttling device with a rotary-type metering element. Visual observation of the current in a specific range of angles of rotation of the throttle valve makes it possible to establish the pulsed current regime. During drainage tests, hysteresis phenomena are manifested in the form of disagreement of the static pressure values at analogous points in the throttling device's duct when the metering element is installed; the discrepancy depends on the element's original position. Figures 5; references 4.

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USSR

UDC 629.7.036.54:533.694

MUKHACHEV, G.A., Khabibullin, F.G., and Arslanova, S.N.

ON CALCULATING NONEQUILIBRIUM, CONDENSING SUPERSONIC FLOWS

Kazan' TRUDY KAZANSKOGO AVIATIONNOGO INSTITUTA [Works of the Kazan' Aviation Institute] in Russian No 184, 1975 pp 40-46

[From REFERATIVNYY ZHURNAL, AVIATIONNOGO I RAKETNYYE DVIGATELI No 2 1976 Abstract No 2.34.129 (resume)]

[Text] On the basis of comparative calculations with the system of equations describing an adiabatic unidimensional current of a spontaneously condensing vapor, the authors reach a conclusion about the identity of the most frequently used expressions for both drop growth rate and nucleus-formation rate that are part of the condensate accumulation equation. They discuss two basic approaches to determining the form of the correction factor, and note that the indicated correction factors, which are called upon to describe the same phenomenon, differ by the sign of their effect. They point out the need for further research, with the final goal of determining reliable correction factor values. Figures 5; references 10.
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USSR

LOZHKIN, A. L., Galitseyskiy, B. M.

USE OF THE METHOD OF PHASE INTEGRALS FOR CALCULATION OF OSCILLATIONS OF COMPLEX SHAPE WITH NONISOTHERMAL FLOW OF GAS IN A CHANNEL

[TR] MOSK. AVIATS. IN-TA in Russian 1975, No. 340 pp 9-14

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No. 7B1172 by N. A. Kolesnikova]

[Text] The method of phase integrals is used to develop a method for calculation of pressure fluctuations and flow rates of complex form with nonisothermal flow of a gas in a channel. It is established that the form of the fluctuations of the gas stream significantly influences the nature of the distribution of pressure and the mass velocity over the length of the channel. With fluctuations differing significantly from harmonic fluctuations, this influence must be considered. Results are presented from an approximate numerical calculation using a computer.

USSR

FOMIN, V. M.

STUDY OF INFLUENCE OF THE STATE OF THE BOUNDARY LAYER ON THE AERODYNAMIC CHARACTERISTICS AT TRANSSONIC VELOCITIES

UCH. ZAP. TSENTR. AERO-GIDRODINAM. IN-TA in Russian 1975, Vol. 6 No. 6 pp 48-58

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No. 7B1110 from the resume]

[Text] Results are presented from certain physical and gravimetric investigations of profiles in the transsonic velocity range at $Re = (2-3) \cdot 10^6$. It is shown that an increase in the thickness of the boundary layer on the profile and strengthening of the interaction of the nonviscous stream with the boundary layer with displacement of the transition "point" forward on the profile may lead to a significant change in flow around the profile and aerodynamic forces and moments, as well as their dependence on the angle of attack and M number.

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USSR

UDC 533.69.048

MONAKHOV, N. M.

ON THE PROBLEM OF A HYPERSONIC FLOW OF GAS AROUND A THIN BLUNT BODY OF ROTATION

Kazan' IZVESTIYA VUZOV AVIATIONNAYA TEKHNIKA in Russian No 2, 76 pp 68-73 manuscript received 14 Feb 75

[Abstract] The author considers the flow of an ideal gas around thin blunt bodies of rotation, the shock waves of which approximate the parabolic shock waves of the theory of strong shocks and are described by exponential polynomials. The method of the deformation of coordinates is used in the solution of the main equation of gas dynamics and in the determination of the isometric values of the flow parameters at the surface of the body.
Tab 1 Ill 2 Bibl 4

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USSR

KOSHMAROV, YU. A., SVIRSHCHEVSKIY, S. B., INOZEMTSEVA, YE. N.

STUDY OF RESISTANCE OF TRANSVERSE FLOW AROUND PACKETS OF PIPES AT LOW REYNOLDS NUMBERS

TEMAT. SB. NAUCH. TR. MOSK. AVIATS. IN-TA in Russian 1975, No. 334
pp 58-62

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No. 7B518 by E. G. Namsarayev]

[Text] Results are presented from an experimental study of the resistance of three packets with checkerboard placement of smooth pipes in a transverse, slightly rarified stream of air. The studies are performed in a vacuum gas dynamic tunnel under isothermal conditions with the following parameters: full temperature measured at inlet to critical flow rate meter 288-295 K; static pressure in stream 0.6-6 mmHg; gas velocity 10-16 m/s; Reynolds number 23-225. A generalized dependence is presented in the form $Eu_0 = f(Re)$. The results of the experiment agree satisfactorily with the data of other^g authors. 5 references.

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USSR

KOSHMAROV, YU. A., SVIRSHCHEVSKIY, S. B.

HEAT TRANSFER OF A CONE IN A HIGH-SPEED STREAM OF LOW DENSITY GAS

TEMAT. SB. NAUCH. TR. MOSK. AVIATS. IN-TA in Russian 1975, No. 334
pp 48-58

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No. 7B479 by I. A. Belov]

[Text] A study is made of the stable problem of heat exchange of a strongly cooled thin cone around which a hypersonic stream of gas flows at zero angle of attack. Results are presented from calculation of the equilibrium temperature of the cone in a near free molecular stream within the framework of the theory of first collisions between molecules striking the surface of the cone and reflected from it. The results of calculation are compared with experimental data. 7 references.

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USSR

POLYAYEV, V. M., BASHMAKOV, I. V., VLASOV, D. I., GERASIMOV, I. M.

CERTAIN PECULIARITIES OF THE FLOW IN A TURBULENT BOUNDARY LAYER OVER A PERMEABLE PLATE WITH INJECTION

PRISTEN. TURBULENT. TECHENIYE. CH. 2 in Russian, Nobosibirsk 1975, pp 43-57

[Translated from REFERATIVNYY ZHURNAL MEKHANIKI No. 7, 1976 Abstract No. 7B195 by P. P. Vorotnikov]

[Text] The mean and pulsation characteristics of a turbulent boundary layer over a permeable surface are studied with various values of the injection parameter. It is concluded that the pulsations in the wall area are highly anisotropic; the relationship of the pulsation components of velocity are retained over a distance on the order of the thickness of the boundary layer. Based on measurements, the transverse velocities of vortex transfer are significantly greater than the longitudinal velocities and may exceed the latter by a factor of 2 or 3. 12 references.

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USSR

DEM'YANENKO, V. S., ZHELTOVODOV, A. A.

EXPERIMENTAL STUDY OF CERTAIN CHARACTERISTICS OF THE SEPARATION OF A TURBULENT BOUNDARY LAYER BEFORE A STEP

AEROFIZ. ISSLEDOVANIYA. VYP. 5 in Russian Novosibirsk 1975, pp 135-138

[Translated from REFERATIVNYY ZHURNAL MEKHANIKI No. 7, 1976 Abstract No. 7B198 by M. O. Frankfurt]

[Text] Experimental data are produced on planar separation of a turbulent boundary layer before a step with a height of $h/\delta_1 = 1.1 - 7.3$ ($h = 0-50$ mm) with Mach number $M = 3$ and a single Reynolds number $Re_1 = 63 \cdot 10^6$ (δ_1 is the thickness of the boundary layer before the area of separation). A study is made of the peculiarities (where $h/\delta_1 > 2$) of distribution of pressure on the frontal and upper surfaces of the step, the dependence of the minimum level of pressure on M , the position of the point of attachment. Shadow photographs are used to analyze the structure of the flow in the area of separation. 10 references.

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USSR

UDC 551.593:629.7.014

LAZAREV, A. I., GRECHKO, G. M. (Cosmonaut), VUZNIKOV, A. A.

OBSERVATIONS FROM THE "SALYUT-4" ORBITAL STATION

Leningrad OPTIKO MEKHANICHESKAYA PROMYSHLENNOST' in Russian No. 5, 1976
pp 7-9 manuscript received 4 Nov 75

[Abstract] Results are presented from visual observations made from the Salyut-4 orbital space station of a number of optical-atmospheric phenomena of the night and twilight horizon of the earth. Results of observations of clear horizontal heterogeneities of emission radiation of the upper atmosphere of the earth made by the Soyuz-3, 9, 15 and Salyut-4 are compared. Results are presented and discussed from observations of the twinkling of the planets at the night horizon of the earth and the green light of a portion of the twilight aureole of the earth. The color of the night emission layer noted in January of 1975 from Salyut-4 was gray, sometimes with a brownish shading. Clear heterogeneity of the emission layer of the earth's upper atmosphere was noted several times. A diagram and page from the cosmonaut's journal from one of these occasions is reproduced. The results of visual observations from the Salyut-4 refined

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USSR

LAZAREV, A. I., GRECHKO, G. M. (Cosmonaut), VUZNIKOV, A. A., OPTIKO MEKHANICHESKAYA PROMYSHLENNOST' No. 5, 1976 pp 7-9

our knowledge of a number of atmospheric optical phenomena observed from space at the night and twilight horizon of the earth. The existence of a clear horizontal heterogeneity of the emission radiation of the upper atmosphere was confirmed. Apparently, for the first time strong twinkling of the planets at the night horizon and the green light of a portion of the twilight aureole of the earth at high angles of elevation of the sun over the horizon were observed for the first time from space.

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USSR

UDC 629.78.076.6

ZAKHAROV, YU.A., and KONSTANTINOV, M.S.

OPTIMIZATION OF THE PLAN FOR THE CLOSED, MANNED FLIGHT OF A SPACESHIP WITH AN ENGINE OF LIMITED POWER

Moscow F.A. TSANDER I SOVREMENNAYA KOSMONAVTIKA [F.A. Tsander and Modern Astronautics, Collection of Works] in Russian, Izd-vo Nauka, 1976 pp 166-173

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No 7 1976 Abstract No 7.41.67 (resume)]

[Text] This work is devoted to the problem of the optimum planning of a manned spacecraft with an engine of limited power (low thrust). In order to create artificial gravity on board the spacecraft, it is given intrinsic rotation around its center of mass. The authors propose a new formulation of the basic problem of the mechanics of low-thrust spaceflight -- the problem of finding the conditions for procuring maximum PG [useful load] -- that makes it possible to allow for the spaceship's rotation and to separate the problem into gravimetric and dynamic parts. They present a method of solving the
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USSR

ZAKHAROV, YU.A., and KONSTANTINOV, M.S., F.A. TSANDER I SOVREMENNAYA KOSMONAVTIKA, Izd-vo Nauka, 1976 pp 166-173

problem of the optimum planning of a manned, low-thrust spacecraft that is making a closed, interplanetary flight. As an example, they discuss an Earth-Mars-Earth flight. Figures 2; references 9.

USSR

UDC 629.78.076.6

GUSEV, L.I.

OPTIMIZATION OF FLIGHTS FROM EARTH SATELLITE ORBITS TO LUNAR SATELLITE ORBITS AND BACK, FOR THE CASE OF A FIXED PLANE FOR THE LUNAR SATELLITE ORBITS

UCHENYYE ZAPISKI TSENTRAL'NOGO AERO-GIDRODINAMICHESKOGO INSTITUTA
[Scientific Notes From the Central Institute of Aerohydrodynamics] in Russian, Vol 6 No 6, 1975 pp 124-129

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No 7 1976 Abstract No 7.41.71 (resume)]

[Text] The author discusses a method for computing the characteristic speeds of two-stage flights between circular Earth and lunar satellite orbits when the lunar satellite orbit is in a fixed plane, and determines the orientation of the plane of the selenocentric hyperbola forming the minimum angle $\psi_{\min}$ with a given lunar satellite orbit for both an Earth-Moon flight and the return from the Moon to the Earth. The proposed method uses results obtained during the solution of the problem in an exact formulation, and insures the computation of the summary characteristic speed with an error of less than ± 15 m/sec without solving the boundary-value problem. Figures 4; references 6.

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USSR

UDC 629.76.017.2

ZHERMOLENKO, V.N., and LOKSHIN, B.YA.

ON THE STABILITY OF THE STEADY-STATE MOTION OF A ROTATING ROCKET

Moscow NAUCHNYYE TRUDY INSTITUTA MEKHANIKI MOSKOVSKOGO UNIVERSITETA
[Scientific Works From the Institute of Mechanics, Moscow State University] in Russian No 40, 1975 pp 117-122

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No 7 1976 Abstract No 7.41.80 by E.R.S.]

[Text] The authors investigate the stability of a rotating rocket's flight; that is, a flight during which the rocket's axis of symmetry is tangent to the velocity vector at every point on the trajectory. On the basis of an analysis of the roots of the characteristic equation of the linearized system of equations describing the rocket's motion around its center of mass for constant rates of motion and rotation, they derive the necessary condition for stability of a normal flight with due consideration for the (Magnus) effect. From this condition it follows that for high angular velocities, stability can occur only for a sufficiently small Magnus moment coefficient; as the

USSR

ZHERMOLENKO, V.N., and LOKSHIN, B.YA., NAUCHNYYE TRUDY INSTITUTA MEKHANIKI MOSKOVSKOGO UNIVERSITETA, No 40, 1975 pp 117-122

rotation speed decreases, this coefficient increases hyperbolically. Figures 1; references 4.

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USSR

UDC 629.78.017.2

GROSHEVA, M.V., and SAMSONOV, V.A.

ON INCREASING THE ACCURACY OF DETERMINING THE ORIENTATION OF STABILIZED ISZ'S BY THE SINGLE-VECTOR METHOD

Moscow NAUCHNYYE TRUDY INSTITUTA MEKHANIKI MOSKOVSKOGO UNIVERSITETA [Scientific Works From the Institute of Mechanics, Moscow State University] in Russian No 10, 1975 pp 77-93

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No 7 1976 Abstract No 7.41.84 by T.A.Ye]

[Text] The method of determining the orientation of passively stabilized ISZ's [artificial Earth satellites] from measurements of a single vector gives the value of the parameters determining the orientation with a very low degree of accuracy. As a result of an analysis of the moments of the active forces and the ISZ's induced motion, the authors succeeded in obtaining additional information that makes it possible to achieve a substantial improvement in the accuracy of the determination of stabilized ISZ's orientation by the single-vector system. As a result of the application of their proposed technique, 1/2

USSR

GROSHEVA, M.V., and SAMSONOV, V.A., NAUCHNYYE TRUDY INSTITUTA MEKHANIKI MOSKOVSKOGO UNIVERSITETA, No 10, 1975 pp 77-93

they either discover specific structural requirements for ISZ's or explain the necessity of measuring various specific ISZ characteristics. During the authors' research, they made a number of simplifying assumptions: they used a dipole model of the geomagnetic field, the orbit was assumed to be circular, and atmospheric density was described only approximately. It should be noted that these and the other simplifications that were utilized are not of a fundamental nature, but they do make it possible to demonstrate the difficulties that arise when determining the orientation and methods of coping with them. References 9.

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USSR

ANTONOV, O. N.

THE FIELD OF PRESSURE IN AN INFINITELY LONG SLIT

TR. UFIM. AVIATS. IN-TA in Russian 1975, No. 47 pp 3-7

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No. 7B72 by the author]

[Text] Based on studies of the Reynolds equation, formulas are produced in quadratures which define the flow of a viscous incompressible liquid and the distribution of pressure in an infinitely long slit of arbitrary shape in the direction of flow.

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USSR

UDC 621.039.58

VESELKIN, A. P., KIRILLOV, V. B., NETECHA, M. Ye., and NIKITIN, A. V.

COMPARISON OF THE RADIOACTIVE CONTAMINATION OF COOLANT LOOPS OF WATER-
AND GAS-COOLED REACTORS

Moscow RADIATS. BEZOPASN. I ZASHCHITA AES [AES Radiation Safety and Protection]
in Russian, Atomizdat, No 1, 1975 pp 206-215

[From REFERATIVNYY ZHURNAL, TEPLONERGETIKA No 5 1976 Abstract No 5U202 by
G. I. Korotkina]

[Text] Gas-cooled nuclear reactors [NR's] are examined from the point of view of providing them radiation arrangements that satisfy the health rules. This study is directly related to the studying the activity structure of their primary coolant loops and to determining the radiation fluxes on the equipment during operation and after shut-down, the radioactive exhausts to the atmosphere, and also the consequences of an accidental loss of seal in the primary loop. Seven boiling-water and pressurized-water NR's were

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VESELKIN, A. P., KIRILLOV, V. B., METECHA, M. Ye., and NIKITIN, A. V.,
RADIATS. BEZOPASN. I ZASHCHITA AES, Atomizdat, No 1, 1975 pp 206-215

selected for comparison. Data are presented on the activity of the coolant and deposits on the surfaces of the primary loop equipment. Data are also presented on the primary loop equipment of gas-cooled NR's, and information is presented on the typical isotopic composition and the specific radioactivity of the isotopes in the "Dragon" NR. The specific activity of Co^{60} in large-scale AES's is expected to be $\sim(2-5) \cdot 10^{-8} \text{ Ci/cm}^2$. For comparison, it is shown that the typical Co^{60} activity of the surface deposits in water-cooled NR's is $(0.6-2.0) \cdot 10^{-5} \text{ Ci/cm}^2$. Data are presented on the specific activity and calculated dose of gamma-radiation from an "infinite" steel tube during NR operation. References 21.

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TSYKANOV, V. A., SAMSONOV, B. F., SPIRIDONOV, Yu. G., and FOMIN, N. A.

METHOD TO DETERMINE THE THERMAL CONDUCTIVITY OF URANIUM DIOXIDE AND THE SURFACE CONDUCTANCE AT THE CLADDING-CORE INTERFACE FROM INTERNAL REACTIONS

Dimitrovgrad VOPROSY ATOMNOY NAUKI I TEKHNologii, SERIYA RADIATIONNOYE MATERIALOVEDENIYE, METODIKA I TEKHNologIYA OBLUCHENIYA [Problems of Atomic Science and Technology, Radiation Materials Technology and the Methods and Technology for Irradiation Series] in Russian, No 5, 1975 pp 14-19

[From REFERATIVNYY ZHURNAL, TEPLoENERGETIKA No 7 1976 Abstract No 7G61]

[Text] A method is given for determining the temperature-dependent thermal conductivity of uranium dioxide and the contact conductance of the gas gap between the core and cladding of a fuel element. These quantities should be determined on various samples with different diameters. A method is described for determining the heat-production rate of a fuel element to

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TSYKANOV, V. A., SAMSONOV, B. V., SPIRIDONOV, Yu. G., and FOMIN, N. A., VOPROSY ATOMNOY NAUKI I TEKHNologii, SERIYA RADIATIONNOYE MATERIALOVEDENIYE, METODIKA I TEKHNologIYA OBLUCHENIYA, No 5, 1975 pp 14-19

within 1.5-2.5%. The method is based on using a calibrated electric heater and a sensor to measure the specific energy evolution from reactor gamma-radiation. The total errors in determining the thermal conductivity and the contact conductance do not exceed 4.5 and 8%, respectively. Figures 1; References 4.

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USSR

UDC 621.039.6

YERSHOVA, Z. V., VASIL'YEV, V. G., VVEDENSKIY, V. N., YEVGRAFOVA, D. I., KAPYSHEV, V. K., and MUKHAMET-GALEYEVA, S. Sh.

TRITIUM CYCLE IN A THERMONUCLEAR POWER REACTOR

Leningrad DOKLADY VSESOYUZNOGO SOVESHCHANIYA PO INZHINERNYM PROBLEMAH UPRAVLYAYEMOGO TERMOYADERNOGO SINTEZA, LENINGRAD, 1974 [Transactions of the All-Union Conference on Engineering Problems of Controlled Thermonuclear Fusion, Leningrad, 1974] in Russian Vol 4, 1975 pp 14-40.

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 7 1976 Abstract No 7U113 by K. I. Korotkina]

[Text] The possibility of constructing an industrial thermonuclear reactor (TNR) is examined. The fuel will be a mixture of deuterium and tritium. It is assumed that the TNR will be constructed on the basis of the Tokamak. One of the main design problems will be supplying the expanded production

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USSR

YERSHOVA, Z. V., VASIL'YEV, V. G., VVEDENSKIY, V. N., YEVGRAFOVA, D. I., KAPYSHEV, V. K., and MUKHAMET-GALEYEVA, S. Sh., DOKLADY VSESOYUZNOGO SOVESHCHANIYA PO INZHINERNYM PROBLEMAH UPRAVLYAYEMOGO TERMOYADERNOGO SINTEZA, LENINGRAD, 1974, Vol 4, 1975 pp 14-40

of tritium in a nuclear reactor. Liquid metal lithium is considered as a source of tritium, and lithium and helium are considered as coolants. The following initial data are used for planning the tritium system: radius of the torus 7.2 m, vacuum chamber radius 220 cm, thickness of the production zone 50 cm, temperature of the lithium-containing material 700°C, neutron flux on the surface of the vacuum chamber $1.5 \cdot 10^{14}$ neutrons/(cm²·s), volume of the production zone $3 \cdot 10^8$ cm³, surface of the nuclear reactor (torus) $9.1 \cdot 10^6$ cm², tritium production in the blanket (KTV-1) 400 g/day, and the total amount of lithium in the blanket 150 tons. A block diagram is presented for the tritium system. From approximate estimates, the amount of tritium that is constantly in the systems is as follows: 0.003 kg in the plasma, 4 kg in the production zone, 4 kg in the pumps and 4-8 kg in the

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USSR

YERSHOVA, Z. V., VASIL'YEV, V. G., VVEDENSKIY, V. N., YEVGRAFOVA, D. I., KAPYSHEV, V. K., and MUKHAMED-GALYEVA, S. Sh., DOKLADY VSESOYUZNOGO SOVESHCHANIYA PO INZHINERNYM PROBLEMAM UPRAVLYAYEMOGO TERMOYADERNOGO SINTEZA, LENINGRAD, 1974, Vol 4, 1975 pp 14-40

tritium-gas processing units. The total amount of tritium in the tritium cycle system is ~ 16 kg ($\sim 1.5 \cdot 10^8$ curies). Illustrations 4; References 12.

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USSR

UDC 621.039.534

TRUBNIKOV, V. P., ATROSHCHENKO, E. I., NESTERENKO, V. B., KOVALEV, S. D., and SUKHOTIN, A. M.

Obninsk SOSTOYANIYE I PERSPEKTIVNY RABOT PO SOZDANIYU AES S REAKTORAMI NA BYSTRYKH NEYTRONAKH [Status and Prospects of Work on Designing an AES with Fast Reactors] in Russian, Vol 2, 1975 pp 355-360

[From REFERATIVNYY ZHURNAL 50. YADERNYYE REAKTORY No 4, Apr 76 Abstract No 4.50.121 by A. A. Mel'nichenko]

[Text] The results of a long complex study at the Institute of Nuclear Energy of the Academy of Sciences BSSR are used as a basis to show the advantages of using N_2O_4 as a coolant and working fluid in nuclear reactors. A series of construction materials were defined, which are stable with the coolant over a wide temperature and pressure intervals. From 350-700°C and a pressure of 20-50 atm., the corrosion rate is 0.0003 to 0.0015 g/cm² per hour. The corrosion rate for titanium and its alloys is lower than for stainless steel. The presence of water in the coolant greatly increases corrosion from the gas and also from the gaseous decay products.

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USSR

UDC 621.039.526

NISTRATOV, N. N., TEREKHIN, B. L. and GUDYM, A. A.

CHOICE OF CHARACTERISTICS OF A RAMJET ENGINE SYSTEM AT AN ATOMIC POWER PLANT WITH GAS AND LIQUID-METAL HEAT CARRIERS

Saratov NAUCH SOOBESHCH SARATOV POLITEKHN IN-T [Scientific Conference of Saratov Polytechnic Institute] in Russian, No 10, 1975 pp 70-86

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 4 1976 Abstract No 4U123 by G. I. Korotkina]

[Text] Unlike electric power plants operating on organic fuel an atomic power plant has a closed heat-carrier loop. One observes a substantial dependence of temperature of the feed water on depth of cooling of the heat carrier. So, with initial parameters of the steam of 12.7 MPa, 520/520°C, the reduction in temperature of the heat carrier at the output from the steam generator T_2 to the level below 320°C leads to a sharp reduction in the economic optimum of the feed-water temperature. According to the

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NISTRATOV, N. N., TEREKHIN, B. L. and GUDYM, A. A., NAUCH SOOBESHCH SARATOV POLITEKHN IN-T, No 10, 1975 pp 70-86 [From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 4 1976 Abstract No 4U123]

accepted parameters the regenerative system of heating the feed water must have 6-7 heaters. The authors examine questions of distributing the heat of the feed water in the high-pressure heaters. Figures 4; references 6.

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USSR

UDC 621.039.6

ALIKAYEV, V. V., VINOGRADOV, N. I., GOLANT, V. YE., KALMYKOV, YU. K. and KRIVOSHEYEV, M. V.

ON THE POSSIBILITY OF UHF HEATING OF PLASMA IN A TYPE "TOKAMAK" THERMONUCLEAR REACTOR

Leningrad DOKL VSES SOVESHCH PO INZH PROBL UPRAVLYAYEM TERMOYADER SINTEZA, T 2 [Reports of the All-Union Conference on Engineering Problems of Controllable Thermonuclear Synthesis. Vol 2] in Russian, 1975, pp 206-213

[From REFERATIVNYY ZHURNAL, TEPLONERGETIKA No 6 1976 Abstract No 6U79 by G. I. Korotkina]

[Text] Of the projects known today of thermonuclear reactors the overwhelming majority are based on the use of closed toroidal systems such as the Tokamak. After taking for the Tokamak parameters close to drive parameters in the various projects ($a \sim 2$ m, $R \sim 7$ m, $B \sim 50$ kgs, $n \sim 10^{14}$ cm⁻³), and using the experimental data on the dependence for energy time of holding, it is possible to estimate the necessary powers of additional heating. This quantity

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ALIKAYEV, V. V., VINOGRADOV, N. I., GOLANT, V. YE., KALMYKOV, YU. K. and KRIVOSHEYEV, M. V., DOKL VSES SOVESHCH PO INZH PROBL UPRAVLYAYEM TERMOYADERN SINTEZA, T 2, 1975 pp 206-213 [From REFERATIVNYY ZHURNAL, TEPLONERGETIKA No 6 1976 Abstract No 6U79]

is found to be on the order of 100 MW for a heating time of 1-10 s. The authors examine the methods of heating in the UHF wave band ($\lambda \lesssim 30$ cm). They analyze the possibilities of using lower frequencies. They give a comparative table (see the article) for various methods of heating plasma.

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USSR

UDC 621.039.551

PUTILOV, A. V., MARKINA, M. A., ROBAKIDZE, N. A., RUDOY, V. A., STARIZNYY, YE. S., SYRKUS, N. P.

INFLUENCE OF DISTRIBUTION OF NEUTRON FLUX IN A CORE ON THE POWER OF THE GAMMA RADIATION OF A URANIUM RADIATION LOOP

Moscow ATOMNAYA ENERGIYA in Russian Vol. 41 No. 1, 1976 pp 31-32 manuscript received 4 Jun 75

[Abstract] A mathematical model of a uranium radiation loop is developed on the basis of the programs cycle-one and quantum to determine the influence of R on the gamma power of the radiation source. These programs are used to calculate the radiation characteristics of the source for two types of circulation modes: in the "forward" mode, R increases as the fuel remains in the core, in the "reverse" mode it decreases according to the same rule. This work studies the influence of stepped, exponential and cosine functions of distribution of neutron density on the power extracted from the core, since the distributions encountered in practice may be superpositions of these functions. It is concluded that in the construction of nuclear reactors with this core type, one should attempt to displace the maximum neutron flux density

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USSR

PUTILOV, A. V., MARKINA, M. A., ROBAKIDZE, N. A., RUDOY, V. A., STARIZNYY, YE. S., SYRKUS, N. P., ATOMNAYA ENERGIYA Vol. 41 No. 1, 1976 pp 31-32

toward the location where the nuclear fuel leaves the core, which increases the gamma power of the radiation source.

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USSR

UDC 621.039.58

LARTSEV, V. D., CHERNUKHIN, YU. I.

ESTIMATION OF THE NUCLEAR SAFETY OF A SYSTEM OF SUBCRITICAL ASSEMBLIES BY
THE METHOD OF THE INTERACTION PARAMETER

Moscow ATOMNAYA ENERGIYA in Russian Vol. 41 No. 1, 1976 pp 39-41 manuscript
received 21 May 75

[Abstract] Determination of the maximum permissible number of assemblies in a group and the multiplication factor of the entire system is quite important with group storage of subcritical assemblies with a multiplication factor of neutrons from external sources >1 . In calculating the multiplication factor for systems of identical assemblies, the method of the interaction parameter is frequently used. This method is analyzed and formulas are presented. The formulas are used for several particular cases of calculation of the critical number of assemblies in a grid as the multiplication factor approaches ∞ . For comparison, a figure also presents the results of the corresponding calculations performed by numerical solution of equation (2) from Dowson, D. C., React. Sci. Techn., Vol. 17, No. 1, 1963, p. 1, indicating that the estimates found for n_{cr} differ from the more precise values presented

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USSR

LARTSEV, V. D., CHERNUKHIN, YU. I., ATOMNAYA ENERGIYA Vol. 41 No. 1, 1976
pp 39-41

by Dowson only in the direction of increasing nuclear safety. Thus, the expressions produced for $\bar{R}$, R significantly simplify the calculation procedure for estimation of nuclear safety of systems of subcritical assemblies by the method of the interaction parameter.

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USSR

UDC 539.173.3:546.791.3

PETRZHAK, K. A., PLATYGINA, YE. V., SOLOV'YEV, YU. A., TEPLYKH, V. F.

RELATIVE YIELDS OF THE ISOTOPES OF XENON UPON PHOTOFISSION OF ^{237}Np AND ^{235}U

Moscow ATOMNAYA ENERGIYA in Russian Vol. 41 No. 1, 1976 pp 44-45 manuscript received 28 Oct 75

[Abstract] Using a highly sensitive mass spectrometer, the relative yields of the isotopes of xenon with $A=131-136$ are measured upon fission of ^{237}Np and ^{235}U by Bremsstrahlung. Bombardment was performed on the B-30 betatron of Leningrad Technological Institute. Targets of neptunium dioxide and uranium oxide in the form of pressed tablets with a mass of 1 g were placed near the orbit of the accelerated electrons in a device described in an earlier work in order to increase the absorbed dose. Over a bombardment time of 40-50 hr, the total quantity of xenon formed upon fission was about 10^{-9}cm^3 . After two months holding, the noble gases were extracted from the target by the thermal method in a quartz vacuum system. Gases were purified by the usual method. The spectra of fragment xenon upon photofission of ^{237}Np and ^{235}U are presented in the table accompanying the article. The data produced

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USSR

PETRZHAK, K. A., PLATYGINA, YE. V., SOLOV'YEV, YU. A., TEPLYKH, V. F.,
ATOMNAYA ENERGIYA Vol. 41 No. 1, 1976 pp 44-45

indicate that there is a fine structure in the curve of the yield of fragments with a peak at mass 134. The energy dependence of fission of ^{237}Np is also significant. Thus, the yield of fragments with $A=134$ decreases, while the yield of fragments with $A=131$ increases as the energy of excitation of the fissioning nucleus is increased.

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USSR

UDC 621.039.526:621.039.53

STARKOV, O. V. and KONONOV, YE. S.

ON THE QUESTION OF EVALUATING THE ALLOWABLE CONCENTRATIONS OF NITROGEN IN THE GAS CAVITY OF REACTORS WITH A SODIUM HEAT CARRIER

Obninsk SOSTOYANIYE I PERSPEKTIVY RABOT PO SOZDANIYU AES S REAKTORAMI NA BYSTRYKH NEYTRONAKH. T 2 [State and Prospects of Research on Creating an Atomic Electric Power Plant With Fast-Neutron Reactors. Vol 2, Collection of Works] in Russian, 1975 pp 558-568

[From REFERATIVNYY ZHURNAL, TEPLONERGETIKA No 3 1976 Abstract No 3U52 by G. I. Korotkina]

[Text] The authors report on the experimental establishment of the primary quantitative dependences of the mechanical properties of austenitic steel on temperature and pressure of nitrogen in the system, and also the influence of sodium on the kinetics of the process of nitriding. Samples of dumbbell type were prepared from 1Kh16N15M3B steel, containing 0.07 mass % C, 0.56 Mn, 0.29 Si, 0.008 S, 0.013 P, 16.2 Cr, 14.5 Ni, 0.76 Nb and 3.04 Mo. They cite data

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USSR

STARKOV, O. V. and KONONOV, YE. S., SOSTOYANIYE I PERSPEKTIVY RABOT PO SOZDANIYU AES S REAKTORAMI NA BYSTRYKH NEYTRONAKH. T 2, 1975 pp 558-568 [From REFERATIVNYY ZHURNAL, TEPLONERGETIKA No 3 1976 Abstract No 3U52]

on the mechanical properties of 1Kh16N15M3B steel samples after tests in sodium under an atmosphere of nitrogen and in nitrogen over sodium. The tests, which lasted up to 400 h, were conducted at a temperature of 500 -- 800°C and a nitrogen pressure of 3 and 21 kgf/cm²) for a period of 400 h. Parameters exist which are not taken into account during the tests and may increase the influence of nitrogen in real components and parts on their mechanical properties; neutron irradiation, carbonization, thermomechanical stress and creep. These factors must be taken into account in subsequent experiments. Figures 2; tables 2; references 8.

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USSR

UDC 621.039.54:621.039.53

SERGEYEV, V. S., KARPOV, V. M. and ANUCHKIN, A. M.

COMMENSURABILITY OF A URANIUM METALLIC FUEL WITH OKH16N15M3B
CHROME-NICKEL STEEL

Obninsk SOSTOYANIYE I PERSPEKTIVY RABOT PO SOZDANIYU AES S REAKTORAMI NA BYSTRYKH NEYTRONAKH. T 2 [State and Prospects of Research on Creating an Atomic Electric Power Plant With Fast Neutron Reactors. Vol 2] in Russian, 1975 pp 542-557

[From REFERATIVNYY ZHURNAL, TEPLONERGETIKA No 3 1976 Abstract No 3U117 by G. I. Korotkina]

[Text] The designers of fast reactors are confronted with the question of the necessity of creating economically feasible fuel elements. One of the possible ways of solving this problem is the use of metallic uranium and uranium-plutonium fuel. They report that upon irradiation of uranium-plutonium fuel the achievable density of fission was equal, and in certain instances, exceeded the density of fission for oxide and carbide fuel without any notable change in the form of the samples. They investigated

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USSR

SERGEYEV, V. S., KARPOV, V. M. and ANUCHKIN, A. M., SOSTOYANIYE I PERSPEKTIVY RABOT PO SOZDANIYU AES S REAKTORAMI NA BYSTRYKH NEYTRONAKH. T 2, 1975 pp 542-557 [From REFERATIVNYY ZHURNAL, TEPLONERGETIKA No 3 1976 Abstract No 3U117]

the mechanism of diffusion interaction of OKh16N15M3B steel with uranium and several alloys on its base for the purpose of seeking the possibility of ensuring commensurability of the fuel with the shell at temperatures up to 700 -- 750°C. The samples were annealed in a temperature range of 400 -- 800°C in a vacuum of $5 \cdot 10^{-5}$ mmHg. They give the microstructures of the zones of interaction between uranium and steel, obtained at various temperatures after 100 hours of diffusion annealing. Annealing at a temperature of 750°C and above leads to the formation of a eutectic and fusion of the samples. Preliminary investigations showed that the protective barriers of such materials as V, Zr, Nb, Ta, and Mo may ensure long-term commensurability at temperatures up to 700 -- 800°C. Figures 7; references 7.

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USSR

UDC 621.039.53

UMNYASHKIN, YE. V., ZOTOV, V. V. and SAMKOTRYASOV, A. YE.

INFLUENCE OF POTASSIUM AND CALCIUM IN SODIUM ON THE KINETICS OF SODIUM TRANSPORT OF CARBON FROM A CONSTANT SOURCE TO Khl8N10T STAINLESS STEEL

Obninsk SOSTOYANIYE I PERSPEKTIVY RABOT PO SOZDANIYU AES S REAKTORAMI NA BYSTRYKH NEYTRONAKH. T 2 [State and Prospects of Research on Creating Atomic Electric Power Plants With Fast-Neutron Reactors. Vol 2, Collection of Works] in Russian, 1975 pp 492-503

[From REFERATIVNYY ZHURNAL, TEPLONERGETIKA No 3 1976 Abstract No 3U171 by G. I. Korotkina]

[Text] The authors conducted a number of experiments designed to study the influence of potassium and calcium additives on the kinetics of carbon transport from a source (steel 3, steel U8, graphite) to Khl8N10T chrome-nickel steel. They cite the results of these experiments. The tests were done in reaction vessels with

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USSR

UMNYASHKIN, YE. V., ZOTOV, V. V. and SAMKOTRYASOV, A. YE., SOSTOYANIYE I PERSPEKTIVY RABOT PO SOZDANIYU AES S REAKTORAMI NA BYSTRYKH NEYTRONAKH. T 2, 1975 pp 492-503 [From REFERATIVNYY ZHURNAL, TEPLONERGETIKA No 3 1976 Abstract No 3U171]

a volume of the loading sodium of 50 to 60 cm³. They give the chemical composition of the steel. The tests in the reaction vessels of steel 3 with potassium added to the sodium were conducted at a temperature of 600 and 700°C for a time of 200 and 500 h, respectively. The experiments with the calcium additive in the sodium were conducted in vessels of steel 3 at a temperature of 600°C for a time of 500 h. The potassium concentrations in the tests reached 5 mass%, the calcium concentrations reached 1 mass%. Figures 8; table 1; references 7.

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USSR

UDC 621.039.548.3

NASKIDASVILI, I. A., MAYLE, Kh. E., and DOLIDZE, V. M.

EFFECT OF LOW-TEMPERATURE NEUTRON IRRADIATION ON URANIUM-ALUMINUM INTER-METALLIC COMPOUNDS

Khar'kov VOPR. ATOM. NAUKI I TEKH. SER. FIZ. RADIATION. POVREZHDENIY I RADIATION. MATERIALOV [Problems of Atomic Science and Technology, Physics of Radiation Damage and Radiation Materials Technology Series, Collection] in Russian No 1(2), 1975 pp 81-83

[From REFERATIVNYY ZHURNAL, 50. YADERNYY REAKTORY No 6 1976 Abstract No 6.50.148]

The effects of low-temperature (100-120°K) neutron irradiation is studied on intermetallic compounds of U and Al. Intermetallic compounds UAl_2 and UAl_3 were irradiated with an integral thermal neutron flux of $3 \cdot 10^{18}$ neutrons/cm². The result was a disappearance of their x-ray diffraction patterns, which is related to a weakening of intermetallic grains with average dimensions of 100-300 Å. Illustrations 4; References 14.

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USSR

UDC 621.039.519

SHAGALOV, A. G., and OSYANNIKOV, S. K.

INVESTIGATION OF THE NOISE OF A COOLANT MOVING WITH BOILING IN A CHANNEL

Sverdlovsk 5-YA NAUCH.-TEKH. KONF. URAL'SK. POLITEKH. IN-TA 1976, TEZISY DOKL. SEKTS TEPLOENERG. FAK. [Fifth Scientific-Technical Conference of the Ural Polytechnic Institute, 1976, Report Abstracts, Thermal Power Faculty, Collection] in Russian No 6, 1976 pp 16-17

[From REFERATIVNYY ZHURNAL, 50. YADERNYYE REAKTORY No 6, 1976 Abstract No 6.50.67]

[Text] The noise spectrum of a pressurized-water power reactor coolant moving in a single channel was studied experimentally. The nature of the spectrum depends on the boiling in the channel and on the type of boiling.

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USSR

UDC 629.7.015.3.036: 533.697.2

DUGANOV, V. V., and POL'YAKOV, V. V.

HYPERSONIC FLOW IN A CONICAL CONVERGENT DUCT

Kazan' IZVESTIYA VUZOV AVIATIONNAYA TEKHNIKA in Russian No 2, 76 pp 124-128 manuscript received 4 Oct 74

[Abstract] The authors calculate the flow of an ideal gas with adiabatic index $\gamma = 1.67$ in a conical convergent duct with a pointed intake edge by the method of continuous calculation for intake flow Mach numbers $M_\infty = 5, 10, 15, 20, 25, 35$, with three fixed values of the hypersonic similitude criterion $K = M_\infty$, $\tan \delta = 1, 2, 3$, where δ is the half angle of the conical duct. It is shown that the theory of hypersonic similitude holds true for an internal flow of a gas in such a duct in the presence of a system of oblique shocks in the flow. The error of execution of the law of similitude does not exceed five percent if the local values of the Mach number in the duct are greater than M_4 . Ill 5 Bibl 3

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USSR

UDC 621.311.2:621.039.001.2.003.1

POPYRIN, L. S., NAUMOV, YU. V. and IVANOV, A. A., Irkutsk

OPTIMIZATION OF THE CIRCUITS AND PARAMETERS OF EQUIPMENT USED IN THE THERMAL POWER PART OF TWO-LOOP ATOMIC ELECTRIC POWER PLANTS WITH WATER-WATER REACTORS

Moscow IZVESTIYA AN SSSR, ENERGETIKA I TRANSPORT in Russian No 2 Mar-Apr 76 pp 124-136 manuscript received 5 Mar 75

[Abstract] The authors formulate the problem of optimizing the thermal power part of an atomic electric power plant with a water reactor under pressure. They describe its mathematical model and cite the results of optimization investigations of a steam generating installation and a turbine installation as well as the results of an overall economic and technical optimization. They analyze the influence of indeterminacy in the original technical and economic information on the results of the investigations. Figures 6; tables 5; references 7: 7 Russian.

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EAST GERMANY

RICHTER, D., and BIRKIGT, W., State Bureau of Nuclear Safety and Radiation Protection, East Berlin, members of the Commission on the Transportation of Hazardous Goods at the Ministry of Transportation of the German Democratic Republic

TRANSPORTATION OF IRRADIATED NUCLEAR FUELS (A PROGRESS REPORT)

East Berlin KERNENERGIE in German Vol 19 No 3, Mar 76 pp 73-82 manuscript received 20 Jun 75
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[Abstract] This review covers the following subjects: requirements imposed on transportation equipment and procedures, degree of hazard of various types of irradiated nuclear fuels, safety regulations for the transportation of irradiated nuclear fuels in various countries (international, East-German, etc.), approval procedures, transportation methods (transport containers, vehicles), transportation experiences (in the US, Western Europe, and East Germany, and future problems. Tables 6; figures 2; references 40: 22 Western, 1 Polish, 1 Russian, 1 Czechoslovak, and 15 German.

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USSR

UDC 621.311.25:621.039

AMASYAN, R. O., and GOMTSYAN, K. P.

EXPERIMENTAL STUDY ON INTERACTION MODELS OF THE EQUIPMENT SECTION OF THE ARMENIAN AES WITH ITS SOIL BASE

Yerevan IX OB"YEDIN. SESSIYA NAUCH.-ISSLED. IN-TOV ZAKAVKAZ. RESP. PO STR-VU [Ninth Combined Session of the Scientific Research Institutes of the Transcaucasus Republics on Construction, Collection] in Russian, Aystan, Vol 1, 1975 pp 60-63

[From REFERATIVNYY ZHURNAL, TEPLONERGETIKA No 5 1976 Abstract No 5U89 by G. I. Korotkina]

[Text] By now experimental data have been accumulated on the seismic stability of an AES. These data were obtained based on research using rigid seismic platforms. This research was used in an attempt to resolve several of the basic interaction problems of the Aermenian AES with its soil base. The initial process modeling parameters for the seismic action are the contact stress between the base and the foundation of the building. The

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USSR

AMASYAN, R. O., and GOMTSYAN, K. P., IX OB"YEDIN. SESSIYA NAUCH.-ISSLED. IN-TOV ZAKAVKAZ. RESP. PO STR-VU, Aystan, Vol 1, 1975 pp 60-63

initial data were taken to be the total structural mass of 41,000 tons, a 6 kg/cm^2 stress under the foundation of the equipment shell, and an average density of the base layers of 2.43 ton/m^3 , a base layer elastic modulus of $2 \cdot 10^5 \text{ kg(force)/cm}^2$, and a Poisson coefficient of 0.3.
References 1.

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USSR

UDC 627.824:624.15.012.4.042.7

SAVICH, A. I., YASHCHENKO, Z. G., GORBUNOV, A. A.

EXPERIENCE IN THE INVESTIGATION OF THE ROCK BASE OF THE INGURSK ARCH DAM
BY THE SEISMIC METHOD

Moscow GIDROTEKHNICHESKOYE STROITEL'STVO in Russian No. 7, 1976 pp 9-13

[Abstract] The arch dam of the Ingursk Hydroelectric Power Plant, 271 m high, is being constructed in an area weakened by systems of tectonic cracks with the surface significantly altered by exogenous processes. To assure the safety of the dam, a series of seismic studies was undertaken in order to determine the degree of alteration of the rock in the surface portion of the cut, establish the thickness of the rock zones weakened by the overburden removal operations and study the structure of this zone and to clarify the properties of the rock below the weakened zone. The studies were performed with distances between seismic receptors 2 m, length of hodograph about 100 m and charge interval 10-12 m, selected in order to increase the level of detail of the study of the weakened zone. The data produced indicate high effectiveness of the use of seismic methods to study the condition and properties of rock in the surface portion of construction

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USSR

SAVICH, A. I., YASHCHENKO, Z. G., GORBUNOV, A. A., GIDROTEKHNICHESKOYE
STROITEL'STVO No. 7, 1976

trenches. The results are quite complete and allow rather rapid production of valuable information concerning changes in the properties of the rock of the near-surface portion of a mass during the process of earth moving operation, determination of weak areas and establishment of the parameters of the area for additional earth removal.

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USSR

UDC 621.643.002.2+551.481.2

CHIRSKOV, V. G., Glavsibtruboprovodstroy, Tyumen'

PROBLEMS OF YEAR-ROUND CONSTRUCTION OF PIPELINES IN A SWAMPY AREA

Moscow STROITEL'STVO TRUBOPROVODOV in Russian, No 1, Jan 76 pp 10-13

[Abstract] The author studies a number of problems whose solution will facilitate the organization of year-round construction of main pipelines on the swamp areas of Western Siberia. Included in these problems are increasing the use of special technology, improving the technology of the operations, improving engineering preparation of the route and laying permanent roads alongside the route in the areas where the oil and gas lines are being built. Figures 4.

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USSR

BIRBRAYER, A. N.

CHANGE IN THE PROFILES OF FILLS OF NONCOHESIVE SOILS DURING EARTHQUAKES

IZV. VNII GIDROTEKHN. in Russian 1975, Vol. 109 pp 137-147

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No. 7V910 by the author]

[Text] A method is presented for analysis of irreversible changes in the trapezoidal profiles of fills made of noncohesive soils during earthquakes. Differential equations are presented describing the "flattening" of a slope and the settling of the ridge of a fill in the case of profiles with one or two free slopes. Results are presented from numerical calculations, showing that the change in profile becomes slower with increasing fill height, and in the case of periodic base oscillations -- with increasing frequency of the oscillations. The results of numerical calculations are compared with experimental data. 8 references.

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USSR

UDC 624.074.4.012.45.042.2

KRIVITSKIY, V. P., Kazakh Promstroyniiproekt Institute

TESTING OF SHELLS FOR ROOFING OF EARTHQUAKE-RESISTANT BUILDINGS

Moscow BETON I ZHELEZOBETON in Russian No. 7, 1976 pp 35-37

[Abstract] An experimental construction project was undertaken in Dzhambul, involving roofing of a 3900 m² building with 12 gently sloping precast monolithic four-lobed structures of reverse Gaussian curvature each measuring 18 x 18 m. The roof, acting as a load-bearing and protecting structure, was assembled of light concrete slabs measuring 3000 x 9000 mm and prestressed with triangular type diaphragms. The experiments performed indicated the basic dynamic characteristics of precast monolithic shells of negative Gaussian curvature necessary to determine the seismic load. The tests showed that with accuracy sufficient for planning, the roof can be considered a rigid disc in the horizontal plane. The dynamic rigidity of the diaphragms must be considered in determining the vertical component of seismic action. Construction of the experimental roof confirmed the desirability of using such shells for roofing of buildings erected in earthquake-prone areas.

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USSR

UDC 624.138.29

LITVINOV, I. M., Scientific Research Institute for Construction Structures, State Construction Commission, USSR

EXPERIENCE IN HYDROEXPLOSIVE COMPACTING OF SAGGING SOILS IN THE CONSTRUCTION OF A LARGE INDUSTRIAL COMPLEX

Moscow OSNOVANIYA, FUNDAMENTY I MEKHANIKA GRUNTOV No. 4, 1976 pp 4-6

[Abstract] In planning the construction of a large natural gas processing plant, it was originally planned to sink some 9000 reinforced concrete piles into the sagging loess soil, which would have required a great deal of time, effort and money. The problem was solved by sinking pipes into the soil, saturating the soil with water fed in through the pipes, detonation of explosive charges at the bottoms of the pipes, causing sudden sinking and compacting of the soil, backfilling of the area with a sand-gravel mixture and construction of the plant on this "pre-settled," firmer basis.

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USSR

UDC 624.138.22/26

DYKHOVICHNAYA, N. A., Central Scientific Research Institute for Experimental Planning of Housing, and KRUTOV, V. I., Scientific Research Institute for Foundations

CONSTRUCTION OF A NEW REGION IN TOL'YATTI ON SETTling SOILS

Moscow OSNOVANIYA, FUNDAMENTY I MEKhanIKA GRUNTOV No. 4, 1976 pp 7-11

[Abstract] This article describes the successful cooperation of the two scientific research institutes mentioned in the header in the construction, over an eight year period, of the new city of Tol'yatti, constructed almost entirely on sagging, loess-type soil. The editors note that this is a shining example of the cooperation of scientific research institutes and production organizations in performing work at the forefront of construction technology. Operations of compacting of the soil were continued almost throughout the year, and only in two cases did freezing of the soil in the winter cause the compacting operations to be unsuccessful, resulting in slight cracking of building walls upon settling when the soil thawed.

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USSR

UDC 624.624.138.9

KRAVTSOV, G. I., STAROV, A. V., POLOZHNOV, V. I., Groznensk Petroleum Institute

STABILIZATION OF LOESS SOILS IN CASES OF SETTling BENEATH BUILDINGS AND STRUCTURES

Moscow OSNOVANIYA, FUNDAMENTY I MEKhanIKA GRUNTOV No. 4, 1976 pp 11-13

[Abstract] In spite of the advances in the area of planning and construction of buildings on loess-type sagging soils, settling does sometimes occur, resulting in damage to buildings. The authors discuss some problems of planning and realization of the method of organized moistening of soils to prevent damage to buildings where settling is occurring. This method has been used to stabilize the foundations of over 20 buildings and structures which would otherwise have been put out of use, providing a savings of over 1 million rubles.

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USSR

UDC 624.072.233.5.044.046:519.2

SKLADNEV, N. N., DEMINOV, P. D., Moscow Institute of Construction Engineering

CALCULATION OF FOUNDATION BEAMS WITH RANDOM RIGIDITY CHARACTERISTICS ON
STATICALLY HETEROGENEOUS ELASTIC SOILS

Moscow STROITEL'NAYA MEKHANIKA I RASCHET SOORUZHENIY in Russian No. 4, 1976
pp 13-17

[Abstract] A statistical estimate of the operational characteristics of a beam -- strength and crack resistance of normal sections, opening of cracks, bends, as well as the overall reliability of the structure -- is presented for an infinitely long reinforced concrete beam on an elastic Winkler base, loaded with a distributed load or system of regularly placed concentrated loads. The reinforcement of the beam may be either symmetrical or asymmetrical in the case of loading with a system of concentrated loads. The bending rigidity of the beam is considered a random quantity, the external load and base support coefficient are considered to be random stationary functions of coordinate x . All statistical irregularities are assumed small, so that the method of the small parameter can be used.

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USSR

UDC 624.072.041.2:512.83:681.3

SERGEYEV, N. D., Leningrad Institute of Construction Engineering

CALCULATION OF STATICALLY UNDEFINED SYSTEMS WITH MULTISTAGE SUCCESSIVE
MODIFICATION

Moscow STROITEL'NAYA MEKHANIKA I RASCHET SOORUZHENIY in Russian No. 4, 1976
pp 26-31

[Abstract] This article is a continuation of an earlier work from the same journal, No. 6, 1975. In the development of the Argiros-Kelsi algorithm, the advantages of which in comparison to the algorithm of the parallel element are demonstrated in the earlier work, plans for the multistage recalculation of a rod system are given with changing rigidity of its elements, including elimination of a portion of the existing and introduction of new rods. Plans for recalculation of statically (kinematically) undefined rod systems which are economical from the standpoint of machine time are analyzed as the rigidity of the limits is changed and elements are added or subtracted. During the process of recalculation, data are prepared which are required for the next stage of modification.

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USSR

UDC 624.074.4.014.042.5

PUKHOVSKIY, A. B., Moscow Institute of Construction Engineering

THE INFLUENCE OF SOLAR RADIATION ON METALLIC CYLINDRICAL SHELLS

Moscow STROITEL'NAYA MEKHANIKA I RASCHET SOORUZHENIY in Russian No. 4, 1976
pp 31-34

[Abstract] Metallic cylindrical shells, in the form of containers, pipes, towers and masts, are structures which are not protected from the influence of solar radiation. When heated on one side due to solar radiation, these shells develop temperature deformations and resultant forces, which may be significant. However, this fact is not yet sufficiently considered in designing such structures. This article studies the influence of solar radiation under these conditions and suggests a method of calculation allowing the additional temperature stresses arising in such shells during both summer and winter to be calculated.

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USSR

UDC 621.187.123:628.165.048.002.637.001.5

SEYNTKURBANOV, S., AKAMOV, M. and BAYRAMOV, R.

EXPERIMENTAL INVESTIGATION OF SCALE DEPOSITS ON AN UNHEATED SURFACE DURING DISTILLATION OF GROUND WATERS

PROBL OSVOYENIYA PUSTYN' [Problems of Conquering Deserts] in Russian, No 5, 1975 pp 58-62

[From REFERATIVNYY ZHURNAL, TEPLONERGETIKA No 6 1976 Abstract No 6R135 by A. A. Pshemenskiy]

[Text] The results of test-bench investigations demonstrated that scales are formed, consisting of 95% CaCO_3 on unheated brass surfaces when calcium carbonate flows around the supersaturated solution (water temperature 55-90° C). With growth in the bicarbonate ions from 2 to 4.28 mg-ekV/kg the intensity of the scale formation grows from 1 to 4.0 g/(m²·hour), this latter is also increased with growth in rate of movement of the water: proportionally to $W^{0.49}$, where W is the speed of the water and water temperature: proportionally to $t^{2.7}$. The original water is underground water of various wells and contains in mg-ekV/kg: Ca 12-38; Mg 17-94;

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USSR

SEYNTKURBANOV, S., AKAMOV, M. and BAYRAMOV, R., OSVOYENIYA PUSTYN', No 5, 1975 pp 58-62 [From REFERATIVNYY ZHURNAL, TEPLONERGETIKA No 6 1976 Abstract No 6R135]

Cl^- 30-330; SO_4^{2-} 47-135; HCO_3^- 1.8-4.3; $\text{Na}^+ + \text{K}^+$ 52-320. Figures 4; table 1; reference 1. Physico-Technical Institute of the Turkmen SSR.

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USSR

UDC 621.181.8-54.001.24

ZMACHINSKIY, A. V., SHLEYFER, B. M. and ANTROPOV, G. V.

COMPARATIVE ANALYSIS OF THE METHODS OF REGULATING THE TEMPERATURE OF INTERMEDIATE HEATING OF STEAM

Saratov NAUCH SOOBESHCH SARATOV POLITEKHN IN-T [Scientific Reports from Saratov Polytechnic Institute] in Russian No 11, 1975 pp 84-91

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 6 1976 Abstract No 6R80]

[Text] Computations made with respect to a steam generator of the 1200 MW block (with single industrial heating) revealed that during operation on black oil with recirculation of the gases to the furnace the following quantities will be economically justified: amount of gas consumption through the basic gas line 0.748 and gas temperature before the parallel gas lines 932° C. Here one is assured of the necessary range of temperature regulation of the intermediate heating of the steam at reduced loads. In a

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ZMACHINSKIY, A. V., SHLEYFER, B. M. and ANTROPOV, G. V., NAUCH SOOBESHCH SARATOV POLITEKHN IN-T, No 11, 1975 pp 84-91 [From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 6 1976 Abstract No 6R80]

version of the same steam generator with double industrial heating one finds to be the most economically feasible the temperature of the steam in front of the parallel gas lines (at the input second industrial heater) to be 832° C, which also satisfies the requirements of protection of the second intermediate heater during periods of startup from the hot state and load discharges. The method also permits computing the optimal temperature of the gases at the input to the second heater in the steam generator with sequential arrangement of the heating surfaces. Figure 1; table 1.

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USSR

UDC 536.717.001.24

GORSKIY, I. M., KOVTUN, I. M. and PONYATOVA, V. A.

THERMODYNAMIC INVESTIGATION OF CYCLES ON DISSOCIATING GASES

Gubkin TEZISY DOKL K PREDSTOYASHCHEY 4-OY NAUCH-TEKHN KONF, POS-VYASHCH VOPR OSVOYENIYA PRIRODN BOGATSTV KMA [Texts of Reports for the Forthcoming Fourth Scientific-Technical Conference, Devoted to Questions of Mastering the Natural Riches of the KMA] in Russian 1975, pp 202-204

From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 6 1976 Abstract No 6G32

[Text] To study the possibility of using a mixture of $\text{CH}_4 + \text{CO}_2$, which reacts according to the scheme $\text{CH}_4 + \text{CO}_2 = 2\text{CO} + 2\text{H}_2$, as the working body the authors examined its thermodynamic properties. The composition of the mixture is determined by solving a system of equations of chemical equilibrium for different values of pressure and temperature. They examine the cycles consisting of 2 isotherms and 2 isobars. The results of the computations made for the cycles with a temperature ratio of $T_3/T_1 = 2.8$ (compression in the compressor for $T_1 = 500$ K, expansion in the turbine for $T_3 = 1400$ K), efficiency of the compression and expansion processes equal to 0.85 and degree of heat regeneration 0.98,

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USSR

GORSKIY, I. M., KOVTUN, I. M. and PONYATOVA, V. A., TEZISY DOKL K PREDSTOYASHCHEY 4-OY NAUCH-TEKHN KONF, POSVYASHCH VOPR OSVOYENIYA PRIRODN BOGATSTV KMA, 1975, pp 202-204 [From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 6 1976 Abstract No 6G32]

demonstrated that in the case of using dissociating gases, the effective efficiency of the cycles grows in comparison with the efficiency of the cycles on nondissociating gases for the same parameters. The highest growth is observed for small degrees of compression. A great influence is exerted on the effectiveness by the regeneration of heat. The amount of heat which may be transferred in the process of regenerative heat exchange is determined by the minimal temperature pressure in the regenerator.

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USSR

UDC [697.644.1:697.4+62-533.65].001.5

SLONEVSKIY, V. F.

SAVINGS IN ENERGY RESOURCES IN THE LOW-TEMPERATURE PROCESSES IN PRIVATE LIFE

Yakutsk SB DOKL VSES NAUCH-TEKHN SOVESHCH. PROBL ENERG KRAYN SEVERA [Collection of Reports of the All-Union Scientific-Technical Conference on Problems of Energy of the Far North] in Russian, 1975 pp 15-20

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 4 1976 Abstract No S196]

[Text] The author proposes a formula for determining the reserve of thermal energy in a room. In the formula he takes into account the internal heat release and solar radiation. To determine the technico-economic effectiveness of introducing combination systems of heating in residential buildings he compares the cited expenditures for heating a microregion with a density brutto 3800 m²/hectare. The heating was computed in three versions: 1. from a thermoelectric center with central regulation

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USSR

SLONEVSKIY, V. F., SB DOKL VSES NAUCH-TEKHN SOVESHCH. PROBL ENERG KRAYN SEVERA, 1975 pp 15-20 [From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 4 1976 Abstract No S196]

of the heat output; 2. from a thermoelectric center with room heat regulators ATR-3b; 3. with electric-reducer-radiators RBE-1 and heat regulators TRG-1. For the closing cost in energy: electrical -- 0.00896 rubles/(kW·h); heat -- 7.61 rubles/Gcal; the cited expenditures according to the versions comprised 10,494, 9,802 and 8,924 rubles/m² of living area, here the expenditure of fuel was 0.0606, 0.049, 0.0502 tons specific heat/(year·m²), respectively.

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USSR

UDC 621.482

ALKHAZISHVILI, Z. D., ANASTASIDI, F. D., BARAMASHVILI, S. N., BACHAKASHVILI, D. G., BUACHIDZE, G. I., BUACHIDZE, I. M., DZHINCHARADZE, G. S., NANITASHVILI, G. V. and ROSEPASHVILI, G. G.

COMMON RESOURCES OF GEOTHERMAL ENERGY IN THE GEORGIAN SSR AND PROSPECTS OF MASTERING THEM

Moscow VSES NAUCH-TEKHN SOVESHCH. ISPOL'Z TEPLA ZEMLI DLYA PROIZVA ELEKTROENERGII, 1975. TEZISY DOKL [All-Union Scientific-Technical Conference. Utilization of the Earth's Heat for Production of Electrical Power, 1975. Texts of Reports, Collection of Works] in Russian, 1975 pp 179-182

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 4 1976 Abstract No 4S78]

[Text] Overall exploitational resources of geothermal waters in the Georgian SSR, confirmed in the period from 1952 to 1972, comprise more than 55 million m³/year. Of them for thermal power purposes are 47.5 million m³/year. In 1975 the overall yield of

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USSR

ALKHAZISHVILI, Z. D., ANASTASIDI, F. D., BARAMASHVILI, S. N., BACHAKASHVILI, D. G., BUACHIDZE, G. I., BUACHIDZE, I. M., DZHINCHARADZE, G. S., NANITASHVILI, G. V. and ROSEFASHVILI, G. G., VSES NAUCH-TEKHN SOVESHCH. ISPOL'Z TEPLA ZEMLI DLYA PROIZVA ELEKTROENERGII, 1975 pp 179-182 [From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 4 1976 Abstract No 4S78]

geothermal waters was 6 million m³/year. Total utilization of the geothermal resources of the Georgian SSR may give a savings in heat equivalent to 2-2.5 million tons specific heat and several million cubic meters of drinking and technical water. It is suggested that research be accelerated and that high-speed drilling be implemented.

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AKHMEDOV, M.-SH. D., AZIZKHANOV, A. L., DZHAMALOV, S. A. and SULTANOV, YU. I.

ON THE POSSIBILITY OF ELECTRIC POWER UTILIZATION OF LOW-POTENTIAL GEOTHERMAL WATERS

Moscow VSES NAUCH-TEKHN SOVESHCH. ISPOL'Z TEPLA ZEMLI DLYA PROIZVA ELEKTROENERGII, 1975. TEZISY DOKL [All-Union Scientific-Technical Conference. Utilization of the Earth's Heat for Production of Electrical Power, 1975. Texts of Reports, Collection of Works] in Russian, 1975 pp 75-78

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 4 1976 Abstract No 4S73 by M. Ye. Zaydman]

[Text] Computations of the vapor-water and freon geothermal cycles showed that in the first cycle 1 T of geothermal water with a temperature of 100°C gives 3.1 kW·h electrical power, and in the second -- 4.73 kW·h for freon 12 and 5.32 kW·h for freon 142. The authors give the scheme of the geothermal device according to

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USSR

AKHMEDOV, M.-SH. D., AZIZKHANOV, A. L., DZHAMALOV, S. A. and SULTANOV, YU. I., VSES NAUCH-TEKHN SOVESHCH. ISPOL'Z TEPLA ZEMLI DLYA PROIZVA ELEKTROENERGII, 1975 pp 75-78 [From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 4 1976 Abstract No 4S73]

which the geothermal water of 100°C enters the water pressure tower with a deaeration capacity, and then to the freon 12 evaporator. The freon vapors pass through the turbine to the loop cooled by the liquid freon. Part of the freon from the loop is directed to the heater where the water from the evaporator also goes. The water, heated to 42°C, goes into the hot water supply and to the heaters. Technico-economic analysis showed the effectiveness of the installation in the geothermal plant in the foothills of Dagestan. Figures 3.

2/2

KREMNEV, O. A., AKHMEDOV, M.-SH. D., AMAYEV, A. A., GOROKHOV, M. I., ZABARNYY, G. N., MOROZOV, YU. P., SULTANOV, YU. I. and SHURCHKOV, A. V.

PROJECT OF A MODEL TEST-INDUSTRIAL GEOMETRIC BOILER

Moscow VSES NAUCH-TEKHN SOVESHCH. ISPOL'Z TEPLA ZEMLI DLYA PROIZ-VA ELEKTROENERGII, 1975. TEZISY DOKL [All-Union Scientific-Technical Conference. Utilization of the Earth's Heat for Production of Electrical Power, 1975. Texts of Reports, Collection of Works] in Russian, 1975 pp 49-51

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 4 1976 Abstract No 4S67 by M. Ye. Zaydman]

[Text] At the Institute of Technical Heat Physics of the Ukrainian SSR Academy of Sciences, in conjunction with the Dagestan' Scientific Research Division of Power Engineering and the Caucasus Administration on Mastering Geothermal Heat, a project was developed for a model geothermal boiler. For this purpose they chose the Makhach-Kalinsk site of geothermal waters, where 17

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USSR

KREMNEV, O. A., AKHMEDOV, M.-SH. D., AMAYEV, A. A., GOROKHOV, M. I., ZABARNYY, G. N., MOROZOV, YU. P., SULTANOV, YU. I. and SHURCHKOV, A. V., VSES NAUCH-TEKHN SOVESHCH. ISPOL'Z TEPLA ZEMLI DLYA PROIZ-VA ELEKTROENERGII, 1975 pp 49-51 [From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 4 1976 Abstract No 4S67]

wells are already being exploited with a daily output of 1500-3120 m³ and a water temperature of 56-57°C. The scheme of the heating and exploitational wells must ensure a closed circulation loop of the heat carrier, and the observation wells -- the collection of information on the dynamics of the thermal and hydrodynamic processes. The authors give brief geological and geothermal characteristics of the site and also the characteristics of the models of different versions of the joining of wells in the geothermal boiler. During exploitation of the boiler in a regime of constant flow the amount of completed liquid must be 6000 m³ per day. The computed time of operation of the boiler before reduction in temperature in the exploited wells is 2 years.

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USSR

UDC 621.482(47+57)

BULOCHNIKOV, L. F., VORONOVITSKIY, V. YA. and TUTAROV, K. P.

EXPERIMENT IN EXPLOITATION OF THE PAUZHETSK GEOTHERMAL ELECTRIC POWER PLANT

Moscow VSES NAUCH-TEKHN SOVESHCH. ISPOL'Z TEPLA ZEMLI DLYA PROIZ-VA ELEKTROENERGII, 1975. TEZISY DOKL [All-Union Scientific-Technical Conference. Utilization of the Earth's Heat for Production of Electrical Power, 1975. Texts of Reports, Collection of Works] in Russian, 1975 pp 26-28

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 4 1976 Abstract No 4S64 by M. Ye. Zaydman]

[Text] The geothermal zones of the Pauzhetsk Region (Kamchatka) are chloride-sodium type, with a general mineralization of 2700-3100 mg/l. On the basis of these waters in 1967 the first geothermal electric power plant was built, fed from eight wells yielding a vapor-water mixture with a heat content of 170 kcal/kg. Two series steam turbines of 2.5 MW were established at the geothermal electric power plant. In 1967 a test steam-vacuum device of 400 kW was built, partially utilizing the heat from the dis-

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USSR

BULOCHNIKOV, L. F., VORONOVITSKIY, V. YA. and TUTATOV, K. P., VSES NAUCH-TEKHN SOVESHCH. ISPOL'Z TEPLA ZEMLI DLYA PROIZ-VA ELEKTROENERGII, 1975 pp 26-28 [From REFERATIVNYY ZHURNAL, TEPLO-ENERGETIKA No 4 1976 Abstract No 4S64]

charge water. As a result of the noncorrespondence of the turbines to the parameters of the natural steam the available power of the plant is less than or equal to 3.2 MW. The test in exploitation showed that the corrosion of the carbon steels used at the plant is not high, this being explained by the presence in the geothermal medium both of corrosion stimulators and inhibitors. In comparison with the diesel plant, the cost of electrical power in the geothermal plant is 2.6 times lower. The geothermal plant the fishing industry enterprises with electrical power and in winter supplies heat supply. By 1980 plans are underfoot for the electrical system to be increased to 23 MW. Figure 1; table 1.

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USSR

UDC 621.482:697.34"313"

TIMOFEYEVSKIY, L. S., BOGUSLAVSKIY, E. I., DZINO, A. A. and SHUSTROVA, A. G.

PROSPECTS OF LOCAL THERMOELECTRICAL SUPPLY FOR INDUSTRIAL PLANTS IN THE FAR NORTH ON THE BASIS OF UTILIZING THE EARTH'S HEAT

Moscow VSES NAUCH-TEKHN SOVESHCH. ISPOL'Z TEPLA ZEMLI DLYA PROIZ-VA ELEKTROENERGII, 1975. TEZISY DOKL [All-Union Scientific-Technical Conference. Utilization of the Earth's Heat for Production of Electrical Power, 1975. Texts of Reports, Collection of Works] in Russian, 1975 pp 14-16

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 4 1976 Abstract No 4S62]

[Text] The authors examine the main scheme of thermoelectrical supply for a large mine and adjacent areas. In developing electrical power the temperature of the geothermal water is reduced to 60-80°C. Part of the water enters the air heater and hydro air heater of the mine installation where the cold air is heated to a temperature of +2°C. The other part of the water is directed

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USSR

TIMOFEYEVSKIY, L. S., BOGUSLAVSKIY, E. I., DZINO, A. A. and SHUSTROVA, A. G., VSES NAUCH-TEKHN SOVESHCH. ISPOL'Z TEPLA ZEMLI DLYA PROIZ-VA ELEKTROENERGII, 1975 pp 14-16 [From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 4 1976 Abstract No 4S62]

to the plant for ensurance of the processes of enrichment by heat, after which with a temperature of 30-40°C it enters the heat transformer and then with a temperature of 70-80°C -- to the heating system and hot water supply system. Figure 1.

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USSR

UDC 662.611

CHUCHKALOV, I. A., AVVAKUMOV, A. M., MIKHAYLOV, I. A. and NIKOLAYEV, V. N.

BASIC LAWS FOR THE VIBRATION PROPAGATION OF A FLAME UNDER VARIOUS INITIAL PRESSURES

Cheboksary FIZ GORENIYA I METODY YEYE ISSLED [Physical Combustion and Methods of Investigating It, Collection of Works] in Russian, 1975 pp 25-32

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 4 1976 Abstract No 4R11]

[Text] The authors cite experimental data on the influence of initial pressure in a pipe on the vibration propagation of a CO-air flame. They show that in the investigated range of pressures of 300 to 2000 mm Hg, the ratio of velocity of acoustical shift to normal rate of combustion during transition to wave formation on the surface of the flame remains constant, the length of the wave of perturbations on the surface of the flame decreases with increase in pressure, and the phase relationships between the

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USSR

CHUCHKALOV, I. A., AVVAKUMOV, A. M., MIKHAYLOV, I. A. and NIKOLAYEV, V. N., FIZ GORENIYA I METODY YEYE ISSLED, 1975 pp 25-32
[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 4 1976 Abstract No 4R11]

fluctuations in pressure in the pipe and the changes in area of the flame surface remain the same with the same ratio of acoustical velocity and normal rate of combustion. Figures 6; references 5.

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USSR

UDC 620.92:621.482(47+57)

DYAD'KIN, YU. D. and PARIYSKIY, YU. M.

PROBLEMS OF DEVELOPING PETROGEO THERMAL RESOURCES FOR THE PURPOSE
OF THEIR THERMOENERGY UTILIZATION

Moscow VSES NAUCH-TEKHN SOVESHCH. IZPOL'Z TEPLA ZEMLI DLYA PRO-
IZ-VA ELEKTROENERGII [All-Union Scientific-Technical Conference.
Utiliization of the Earth's Heat for the Production of Electric
Power, Collection of Works] in Russian, 1975 pp 129-131

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 4 1976 Abstract No
4G33/34 by Yu. A. Mironova]

[Text] The authors have developed a geothermal map of the USSR
which has permitted finding about 30 of the most promising re-
gions for the development of geothermal resources, in which the
100°C-isotherm lies at a depth less than or equal to 3000 m. In
the scheme used for computing the predicted temperatures the basic
parameters are the density of the thermal flux determined in the

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USSR

DYAD'KIN, YU. D. and PARIYSKIY, YU. M., VSES NAUCH-TEKHN SOVESHCH.
IZPOL'Z TEPLA ZEMLI DLYA PROIZ-VA ELEKTROENERGII, 1975 pp 129-131
[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 4 1976 Abstract No
4G33/34]

interval of permafrost rocks and the thermal conductivity of the
rocks determined experimentally. The conclusion is made that in
the area of the Northeastern USSR favorable geothermal conditions
exist for extracting the petrogeothermal resources and their uti-
lization in the processes of mining production, systems of ther-
mal and energy supply for industrial purposes, agricultural pur-
poses and everyday objectives. At the present time in the USSR
and USA the basic direction in this field is the creation of
systems of extraction with underground thermal troughs formed in
the zones of artificial permeability of the rock massif. [Lenin-
grad Mining Institute].

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USSR

LOSKUTOV, G. S.

IGNITION OF A REACTING LIQUID BY A MOVING PARTICLE

MATERIALY 5-Y NAUCH. KONF. PO MAT. I MEKH. TOMSK. UN-T. T. 2 in Russian
Tomsk University Press 1975, p 69

[Translated from REFERATIVNYY ZHURNAL MEKHANIKI No. 7, 1976 Abstract No.
7B632 by V. B. Librovich]

[Text] A study is made of the motion of a heated spherical particle in a reactive incompressible viscous liquid. The problem was solved on the assumption that the distribution of temperature over the particle, due to its small dimensions and high heat conductivity is homogeneous, the heat physical and kinetic characteristics of the liquid and material of the particle are constant and the mode of ignition is normal. Furthermore, it is assumed that all assumptions of the boundary layer theory are correct. As a result of the solution, a transcendental equation is produced for determination of the critical particle size, for which ignition still occurs. Two modes of ignition are discovered: in the first mode the thermal energy

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USSR

LOSKUTOV, G. S., MATERIALY 5-Y NAUCH. KONF. PO MAT. I MEKH. TOMSK. UN-T.
T. 2 1975, p 69

of the particle is predominant, in the second mode -- the kinetic energy.

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USSR

SHASHAKOV, A. G., ABRAMENKO, T. N., DEGTEREVA, L. N.

INFLUENCE OF ELECTRIC FIELD ON HEAT AND MASS TRANSFER IN GAS MIXTURES

SVOYSTVA PERENOSA TEPLA I MASSY VESHCHESTVA in Russian, Minsk 1975
pp 3-8

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No. 7B541 by V. A. Naletova]

[Text] A study is made of the influence of an electric field on the properties of the transfer of polar gases and their mixtures. It is shown that in an electric field, anisotropy of heat conductivity arises, that is the heat conductivity coefficients are not equal to each other when the electric field is parallel to and perpendicular to the temperature gradient; the difference in heat conductivity is determined. A study is made of the contribution of the diffusion thermal effect to the transfer of heat in gas mixtures in an electric field. Using the methods of molecular-kinetic theory, the authors write out an expression for the rate of diffusion and flux of heat in the electric field. The heat

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USSR

SHASHAKOV, A. G., ABRAMENKO, T. N., DEGTEREVA, L. N., SVOYSTVA PERENOSA TEPLA I MASSY VESHCHESTVA 1975, pp 3-8

conductivity factors are calculated in the stable case when there is an electric field present for binary mixtures. Results are presented from calculation of the contribution of the diffusion thermal effect to the transfer of heat in $\text{CH}_3\text{F}-\text{N}_2$ and CHF_3-N_2 mixtures at $T=297$ K. It is shown that the influence of the electric field on mass and heat transfer may be significant (up to 10%) for mixtures with greatly differing masses of molecules.

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USSR

UDC 536.242.001.24

ALAD'YEV, I. T., VOSKRESENSKIY, K. D., TURILINA, YE. S. and TRIFONOVA, N. N.

ON THE QUESTION OF THE INFLUENCE ON HEAT EXCHANGE IN TUBES OF DISSIPATION IN A FLOW OF LIQUID

SB TR ENERG IN-T IM G. M. KRZHIZHANOVSKOGO [Collection of Works of the Energy Institute imeni G. M. Krzhizhanovskiy] in Russian, No 19, 1974, pp 69-73

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 3 1976 Abstract No 3G68 by V. D. Vilenskiy]

[Text] For heat exchange during the flow of a liquid with constant physical properties in a circular tube in the region of thermal and hydrodynamic stabilization the authors find a relationship similar to the Lyon integral. It takes into account the heat separation in the flow by sources of heat and by dissipation. On its base they found an expression for the Nu number during laminar flow. The results of the computations of the Nu number for a turbulent flow are approximated by a dependence which is valid when $5 \cdot 10^3 <$

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USSR

ALAD'YEV, I. T., VOSKRESENSKIY, K. D., TURILINA, YE. S. and TRIFONOVA, N. N., SB TR ENERG IN-T IM G. M. KRZHIZHANOVSKOGO, No 19, 1974 pp 69-73 [From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 3 1976 Abstract No 3G68]

$< Re < 10^5$ and $1 \leq Pr \leq 2$. From the relationships found they made the conclusion that the presence in the current of internal heat sources worsens the heat transfer. References 5.

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USSR

UDC 536.242:532.517.4.001.5

DREYTSE, G. A., YEVDOKIMOV, V. D. and KALININ, E. K.

EXPERIMENTAL INVESTIGATION OF THE INFLUENCE OF CHANGE IN THERMAL FLUX AND CONSUMPTION ON NONSTATIONARY CONVECTIVE HEAT EXCHANGE DURING THE TURBULENT FLOW OF A LIQUID IN A TUBE

NAUCH TR VSES ZAOCH MASHINOSTR IN-T [Scientific Works of the All-Union Correspondence Machine Building Institute] in Russian, No 10, 1974 pp 127-147

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 3 1976 Abstract No 3G71 by V. D. Vilenskiy]

[Text] The results of the investigation of nonstationary convective heat exchange during the turbulent flow of water in a circular tube with a diameter of 8.67 mm, wall thickness of 0.183 mm, length of 1510 mm and change in time of heat release in the tube wall or consumption are given. With a constant consumption and change in heat release for $Re = 5 \cdot 10^3 - 10^5$, $Pr = 2 - 12$, the maximum increases in wall temperature $t_w/0$ and $K = 0.5 - 0.7$, when $t_w/0$ (Nu and Nu_0 are the nonstationary and quasistationary

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USSR

DREYTSE, G. A., YEVDOKIMOV, V. D. and KALININ, E. K., NAUCH TR VSES ZAOCH MASHINOSTR IN-T, No 10, 1974 pp 127-147 [From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 3 1976 Abstract No 3G71]

values of Nu) and after 0.1 - 3 s reached values of $K = 1$. The authors found the dependence of K on the criteria of thermal nonstationarity, Re and Pr numbers. With acceleration of the flow K was increased, with slowdown -- it was decreased. They found the dependences of K on the criteria of hydrodynamic nonstationarity and the Re number. Figures 14; references 9.

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USSR

UDC 621.181

LOKSHIN, V. A., Doctor of Technical Sciences and TULIN, S. N.,
Engineer, All-Union Thermotechnical Institute

PRELIMINARY WARMING OF AIR AND ITS INFLUENCE ON THE OPERATION OF
THE FIRST STAGES OF STEAM GENERATOR AIR HEATERS

Moscow TEPLOENERGETIKA in Russian No 4, 1976 pp 10-15

[Abstract] The authors demonstrate that an installation with sanitary engineering steam air heaters does not ensure the required computed level of air heating even by using a steam pressure of 0.5 MPa as the heating medium. Available devices for preliminary air heating, because of a number of defects, give nonuniform heating of the air over the air heaters reaching 50° C. Nonuniformity in temperature of the preliminary warming of the air is basically due to aerodynamic nonuniformity along the air box (presence of large leaks in the partitions etcetera) as well as to hydraulic expansion in the distribution of steam in the air heaters. In planning and assembling the air heaters it is necessary to ensure

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USSR

LOKSHIN, V. A. and TULIN, S. N., TEPLOENERGETIKA, No 4, 1976 pp
10-15

the absence of flows of cold air by creating reliable seals along the perimeter of the box and between elements (air heaters), as well as welding the distribution partitions between the zones of cold and hot air with a dense solid seam. Under operational conditions it is necessary to improve the system of monitoring the temperature conditions of the operation of the air heaters, the temperature of the air behind the air heaters, installed in the zones of lowest heating determined by calibration of the air intake cross sections. Nonuniformities in the preliminary warming of the air aggravate the onset of corrosion and dense ash deposits, worsen the heat operation of the air heater and reduce the economy in operating the steam generator. Figures 7; table 1; references 4: 4 Russian.

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USSR

UDC 536.242:532.517.4.001.5

ZHUKAUSKAS, A. A., DRIZHYUS, M.-R. M., and BARTKUS, S. I.

EFFECT OF ROUGHNESS ON TURBULENT HEAT TRANSFER OF PLATES FOR VARIOUS Pr VALUES

Novosibirsk PRISTEN. TURBULENT. TECHENIYE [Boundary-Layer Turbulent Flow, Collection], in Russian, Part 1, 1975 pp 241-246

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 5 1976 Abstract No 5G61 by N. V. Medvetskaya]

[Text] The turbulent heat transfer from roughened plates to liquids with Pr numbers of 0.71, 5.4, and 102 was studied experimentally. The roughness was in the form of pyramid protuberances. The roughness parameter $k^+ = ku_*/\nu$ (k is the height of the protuberances, u_* is the dynamic velocity, and ν is the kinematic viscosity) varied from 0 to 300. Measurements were made of the plate wall temperature and the velocity and temperature profiles. Analysis of the data yielded functions for calculating the universal velocity

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USSR

ZHUKAUSKAS, A. A., DRIZHYUS, M.-R. M., and BARTKUS, S. I., PRISTEN. TURBULENT. TECHENIYE, Part 1, 1975 pp 241-246

and temperature profiles. For small values of the parameter k^+ , the heat transfer efficiency was higher as compared with a smooth wall. Illustrations 2; References 2.

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USSR

UDC 697.34:621.482"313"(47+57)

BADAVOV, G. V., and SULTANOV, Yu. I.

THE PROSPECTS OF USING THERMAL POWER SYSTEMS FOR GEOTHERMAL HEATING UNDER THE CONDITIONS OF THE DAGESTAN ASSR

Moscow SB. NAUCH. TR. DAGESTAN. N.-I. OTD. ENERGI. M-VA ENERGI. I ELEKTRIFIK. SSSR [Collection of the Scientific Works of the Dagestan Scientific Research Department of Power of the Ministry of Power and Electrification USSR] in Russian 1975 No 4 Part 2 pp 149-164

[From REFERATIVNYY ZHURNAL, TEPLoENERGETIKA No 5, 1976 Abstract No 5S230 by B. G. Solnyshkin]

[Text] Over 50 large-scale geothermal water deposits have been discovered and mapped in the Dagestan ASSR over the last 10 years. More than 80% of the explored geothermal waters have a temperature of 50-80°C. The characteristics are given for 35 exploited wells and consumers. The thermal efficiency of the wells can be increased by using combined systems, for example with a

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USSR

BADAVOV, G. V., and SULTANOV, Yu. I., SB. NAUCH. TR. DAGESTAN. N.-I. OTD. ENERGI. M-VA ENERGI. I ELEKTRIFIK. SSSR, 1975 No 4 Part 2 pp 149-164

"peak" boiler or heat pump installation. A combined system that covers the base load heating curve with geothermal waters and the peak from electrical energy is more efficient. After the Chirkeyskiy and Miatlinskiy GES's are connected to the combined power grid, there can be excess electrical power on the order of 338 MW and 886 million kW-hr. Part of this energy (9.4 and 13%) can be used during the free part of the electric energy demand curve, although the use could be temporary (5-10 yr). Illustrations 3, References 7.

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USSR

UDC 534.46

AVVAKUMOV, A.M., and CHUCHKALOV, I.A.

EXPERIMENTAL STUDY OF THE MECHANISM OF VIBRATION COMBUSTION CAUSED BY ACOUSTIC INSTABILITY OF THE FLAME

Cheboksary FIZIKA GORENIYA I METODY YEYE ISSLEDOVANIYA [The Physics of Combustion and Methods for Investigating It, Collection of Works] in Russian No 4, 1975 pp 70-74

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 2 1976 Abstract No 2.34.26 (resume)]

[Text] The authors present the experimental results of their investigation of the dependence of the phase relationships during vibration propagation of a flame on the scale of the process. Based on an analysis of schlieren moving picture films obtained with an SKS-1M camera operating in a high-speed mode (up to 8,000 frames per second), they show that as the wave-formation process develops in the flame, the phase shift between the pressure and heat liberation rate fluctuations diminishes. They confirm the previously reached conclusion about flame instability induced by acoustic oscillations as the main element of the feedback mechanism in the second stage of the flame's vibration propagation. Figures 3; tables 1; references 6.

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USSR

UDC 536.46

KRUPININ, V.G., and RUTOVSKIY, V.B.

ON IGNITION CONDITIONS FOR GASSES THAT ARE BEING MIXED

Moscow TRUDY MOSKOVSKOGO AVIATSIONNOGO INSTITUTA [Works of the Moscow Aviation Institute] in Russian No 329, 1975 pp 34-41

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 2 1976 Abstract No 2.34.31 (resume)]

[Text] The authors discuss the diffusion spray formed by a jet of gaseous fuel flowing into a flooded space. They establish that for the case of hydrogen and air mixing at nozzle-discharge temperatures below 1,000-1,500°K, mixture ignition does not take place in the boundary layer. If the temperature is lower than the indicated one, it is necessary to install special devices in order to stabilize the diffusion spray. When hydrogen flows out into a heated medium, the diffusion spray will be firmly stabilized for practically all temperatures of the external medium that exceed the spontaneous ignition temperature. When calculating the discharge temperature that insures

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USSR

KRUPININ, V.G., and RUTOVSKIY, V.B., TRUDY MOSKOVSKOGO AVIATSIONNOGO INSTITUTA, No 329, 1975 pp 34-41

stable ignition of the hydrogen-oxidizing agent mixture, the nerashetnost' [translation unknown] value and the discharge rate can be disregarded. Figures 4; references 5.

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USSR

UDC 536.46:537.28

MEDVEDEV, N.A., MAKSIMOV, N.N., ABRUKOV, S.A., and NOVIKOV, V.YE.

EXPERIMENTAL INVESTIGATION OF THE EFFECT OF A LONGITUDINAL ELECTRICAL FIELD ON FLAME PROPAGATION IN A VERTICAL, SEMIOPEN DUCT

Cheboksary FIZIKA GORENIYA I METODY YEYE ISSLEDOVANIYA [The Physics of Combustion and Methods of Investigating It, Collection of Works] in Russian No 4, 1975 pp 91-102

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 2 1976 Abstract No 2.34.33 (resume)]

[Text] The authors describe their experimental setup and research techniques in detail. They present the results of their experimental investigations of the effect of a constant electrical field on the uniform and vibration propagation of a flame in a vertical, semiopen duct. They show that the electrical field has a substantial effect on flame propagation and is one of the effective methods of influencing the vibration propagation of a flame in ducts. Figures 7; references 7.

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USSR

UDC 629.7.036.3:621.43.038.8

KNYSH, YU.A., and LUKACHEV, S.V.

ON THE USE OF VORTEX ACOUSTIC INJECTORS IN AVIATION GAS-TURBINE ENGINES

Kuybyshev TRUDY KUYBYSHEVSKOGO AVIATIONNOGO INSTITUTA [Works of the Kuybyshev Aviation Institute] in Russian, No 67, 1974 pp 211-213

[From REFERATIVNYY ZHURNAL, AVIATIONNOYE I RAKETNOYE DVIGATELI No 3 1976 Abstract No 3.34.22 (resume)]

[Text] The authors discuss the feasibility of using vortex acoustic injectors in aviation gas-turbine engines. They demonstrate the effectiveness of using acoustic injectors for atomizing liquid fuel and the necessity of suppressing vibrations during the delivery of the gaseous fuel to the combustion chamber with the help of centrifugal injectors. They also make practical recommendations for intensifying or suppressing self-oscillations in the injectors. Figures 2; references 4.

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USSR

UDC 629.7.036.3:536.46

KAYUMOVA, D.S.

THE CHANGE IN THE TEMPERATURE AND SPEED OF COMBUSTION PRODUCTS IN THE PULSATION CYCLE DURING VIBRATION PROPAGATION OF A FLAME IN A TUBE

Cheboksary FIZIKA GORENIYA I METODY YEYE ISSLEDOVANIYA [The Physics of Combustion and Methods of Investigating It, Collection of Works] in Russian, No 5, 1975 pp 8-13

[From REFERATIVNYY ZHURNAL, AVIATIONNOYE I RAKETNOYE DVIGATELI No 3 1976 Abstract No 3.34.23 (resume)]

[Text] The author discusses experimentally obtained temperatures and speeds of combustion products and the changes in these factors within the oscillation period. It is necessary to know the heat carrier's temperature and velocity fields in order to determine the thermal flow and the change in it during the pulsation cycle. Heat exchange between the combustion products and the tube's walls is an unstable process during flame propagation, even if it is averaged for the oscillation period. Figures 3; references 6.

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USSR

UDC 536.46

TOKAREV, V.V.

DEPENDENCE OF THE SUSTAINED COMBUSTION RANGE OF FUEL FED INTO THE RECIRCULATION ZONE ON THE SHAPE OF THE FLAME HOLDER

Kuybyshev TRUDY KUYBYSHEVSKOGO AVIATIONNOGO INSTITUTA [Works of the Kuybyshev Aviation Institute] in Russian, No 67, 1974 pp 45-50

[From REFERATIVNYY ZHURNAL, AVIATIONNYYE I RAKETNYYE Dvigateli No 3 1976 Abstract No 3.34.24 (resume)]

[Text] The author presents the results of experiments in which he investigated the effect of the holder's shape (expansion angle) on the sustained combustion range of fuel fed into the recirculation zone. The experiments were performed with different degrees of blocking of the duct by the flame holder. Figures 3; references 11.

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USSR

UDC 536.46

AVVAKUMOV, A.M., and CHUCHKALOV, I.A.

EFFECT OF PARAMETERS OF THE COMBUSTIBLE MIXTURE AND EQUIPMENT CONDITIONS ON PHASE RELATIONSHIPS DURING VIBRATION COMBUSTION IN TUBES

Cheboksary FIZIKA GORENIYA I METODY YEYE ISSLEDOVANIYA [The Physics of Combustion and Methods of Investigating It, Collection of Works] in Russian, No 5, 1975 pp 14-24

[From REFERATIVNYY ZHURNAL, AVIATIONNYYE I RAKETNYYE Dvigateli No 3 1976 Abstract No 3.34.25 (resume)]

[Text] The authors present the results of an experimental investigation of the phase relationships between the oscillations of flame emission and the acoustic oscillations of the gas column during the vibration combustion of a carbon monoxide-air mixture in tubes. From their analysis of the experimental results, they reach conclusions corroborating the mechanism of vibration combustion, which is related to periodic changes in the flame's area. Figures 7; references 10.

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USSR

UDC 536.46

ISAYEV, N.A., KSENOFONTOV, S.I., and TYAMEYKIN, V.YA.

ON FLAME STABILIZATION IN AN ELECTRICAL FIELD AT LOWERED PRESSURES

Cheboksary FIZIKA GORENIYA I METODY YEYE ISSLEDOVANIYA [The Physics of Combustion and Methods of Investigating It, Collection of Works] in Russian, No 5, 1975 pp 75-80

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 3 1976 Abstract No 3.34.26 (resume)]

[Text] The authors present the results of an experimental investigation of the effect of a longitudinal electric field on flame stabilization at low pressures. They show that in the absence of the effect of an ion wind at low pressures and the presence of an increase in the relative potential gradient, the collapse rates of a flame in an electrical field do not increase, which indicates that the electrical field has little influence on the kinetics of the chemical reactions. Figures 4; references 8.

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USSR

UDC 629.7.036.3:536.46

CHUCHKALOV, I.A., AVVAKUMOV, A.M., MIKHAYLOV, I.A., and NIKOLAYEV, V.N.

BASIC REGULARITIES IN THE VIBRATION PROPAGATION OF A FLAME FOR DIFFERENT INITIAL PRESSURES

Cheboksary FIZIKA GORENIYA I METODY YEYE ISSLEDOVANIYA [The Physics of Combustion and Methods of Investigating It, Collection of Works] in Russian, No 5, 1975 pp 25-32

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 3 1976 Abstract No 3.34.29 (resume)]

[Text] The authors present experimental data on the influence of the initial pressure in the tube on the vibration propagation of a carbon monoxide-air flame. They show that over the investigated range of pressures (300-2,000 mm Hg), the ratio of the acoustic displacement rate to the normal combustion rate during the transition to wave formation on the flame's surface remains constant, the wavelength of the disturbances on the flame's surface decreases as the pressure increases, and the phase relationships between the pressure fluctuations

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USSR

CHUCHKALOV, I.A., et al., FIZIKA GORENIYA I METODY YEYE ISSLEDOVANIYA, No 5, 1975 pp 25-32

in the tube and the changes in the flame's surface area remain the same when the relationship between the acoustic velocity and the normal burning rate is the same. Figures 6; references 5.

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USSR

UDC 629.7.036.54-66:536.46

CHISTYAKOV, YU.L., ARSH, M.M., BATUROVA, G.S., and VOLOSHIN, N.V.

RESEARCH IN THE EFFECT OF IMPURITIES ON THE ELECTRICAL CONDUCTIVITY OF THE FLAME FROM A MIXTURE OF AN ALKALINE METAL NITRITE AND MAGNESIUM

Cheboksary FIZIKA GORENIYA I METODY YEYE ISSLEDOVANIYA [The Physics of Combustion and Methods of Investigating It, Collection of Works] in Russian, No 5, 1975 pp 62-70

[From REFERATIVNYY ZHURNAL, AVIATIONNYYE I RAKETNYYE DVIGATELI No 3 1976 Abstract No 3.34.136 (resume)]

[Text] The authors' electrical conductivity measurements were made by a method based on the change in a circuit's quality factor as a function of the conductivity of the flame from a standard compound. They established that when up to 1 percent of electrophilic impurities is added, there is a sharp decrease in the flame's electrical conductivity. Of the additives that were investigated, FP-3 and FP-4 fluoroplastics lowered the conductivity most effectively. Figures 3; references 6.

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USSR

UDC 629.7.036.54-66:536.46

YEGOROV, M.YE., ORLOV, V.N., LAPTENKOV, B.K., and NIKIFOROV, N.G.

FEATURES OF THE THERMAL DECOMPOSITION OF AMMONIUM PERCHLORATE MIXED WITH SILICA GEL

Cheboksary FIZIKA GORENIYA I METODY YEYE ISSLEDOVANIYA [The Physics of Combustion and Methods of Investigating It, Collection of Works] in Russian, No 5, 1975 pp 93-98

[From REFERATIVNYY ZHURNAL, AVIATIONNYYE I RAKETNYYE DVIGATELI No 3 1976 Abstract No 3.34.143 (resume)]

[Text] The authors used the methods of differential-thermal analysis and thermogravimetry to study the decomposition of ammonium perchlorate by itself and when mixed with silica gel. They observed both a significant displacement of the temperature interval in the high-temperature stage of ammonium perchlorate decomposition, toward the area of lower temperatures, as well as a displacement of the low-temperature stage into the area of increased temperatures. For equal weights of ammonium perchlorate and silica gel in the mixture, there was single-stage process for the thermal decomposition of the
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USSR

YEGOROV, M.YE., et al., FIZIKA GORENIYA I METODY YEYE ISSLEDOVANIYA, No 5, 1975 pp 93-98

ammonium perchlorate. The results obtained by the authors are explained by the effect of the silica gel's developed surface on the thermal decomposition process. Figures 3; references 3.

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USSR

UDC 536.2.01

MAKHIN, V. A., SHMUKIN, A. A. and VESELOVSKIY, V. B.

SOLUTION TO INVERSE PROBLEMS OF THERMAL CONDUCTIVITY WITH A DISCRETE ASSIGNMENT OF TEMPERATURE OVER THE INTERNAL POINTS OF THE BODY

TEPLOFIZ I TEPLOTEKHNICA. RESP MEZHVED SB [Thermophysics and Heat Engineering. Republic Interdepartmental Collection] in Russian, No 29, 1975 pp 34-38

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 3 1976 Abstract No 3G59 by V. D. Vilenskiy]

[Text] The solution to the inverse problem of thermal conductivity for an infinite plate is constructed by the method of successive intervals. On each interval the authors take a linear approximation of the boundary temperature. In the limits of the interval the solution is obtained by the operation method. For accounting for the incorrectness they use the Monte-Carlo method. They make the assumption that in the original data the errors are distributed by normal law. As an example of the computation they give a

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USSR

MAKHIN, V. A., SHMUKIN, A. A. and VESELOVSKIY, V. B., TEPLOFIZ I TEPLOTEKHNICA. RESP MEZHVED SB, No 29, 1975 pp 34-38 [From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 3 1976 Abstract No 3G59]

comparison of the densities of the heat current on the surface of the plate obtained by precise solution and the Monte-Carlo method on 100 operations. Figure 1; references 12. [Dnepropetrovsk Division of the Institute of Mechanics, Ukrainian SSR Academy of Sciences.

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USSR

UDC 536.2.01:536.3.001.24

ZHITOMIRSKIY, I. S. and ROMANENKO, V. G.

SOLUTION TO PROBLEMS OF THERMAL CONDUCTIVITY ASSOCIATED WITH RADIANT AND CONVECTIVE HEAT EXCHANGE ON GRAPHS

Khar'kov VOPR GIDRODINAMIKI I TEPLOOBMENA V KRIOGEN SISTEMAKH
[Questions of Hydrodynamics and Heat Exchange in Cryogenic Systems, Collection of Works] in Russian, No 4, 1974 pp 23-28

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 3 1976 Abstract No 3G60 by V. D. Vilenskiy]

[Text] The authors examine a method of solving nonstationary quasilinear problems of thermal conductivity in complex structures. For unification of the information on the structure of the structural elements they use the concepts of the theory of graphs. They assume that the construction is axisymmetrical and may be approximated by a set of finite shells with a thickness-constant temperature. The problem is reduced to computing the temperature distribution in the system of mutually connected rods. Information on the structure of the system of equivalent rods and their

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USSR

ZHITOMIRSKIY, I. S. and ROMANENKO, V. G., VOPR GIDRODINAMIKI I TEPLOOBMENA V KRIOGEN SISTEMAKH, No 4, 1974 pp 23-28 [From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 3 1976 Abstract No 3G60]

heat interactions is given using a finite oriented graph. Allowance for the dependence of the thermal conductivity coefficient, heat capacity and density is given on temperature. The system of equations is solved by a numerical method. Figures 3; references 7.

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USSR

UDC 629.7.036.54-66:536.46:667

BATUROVA, G.S., ZABBAROVA, A.F., MADYAKIN, F.P., and PROSTATOVA, L.I.

IGNITION OF HETEROGENEOUS MIXTURES UNDER DYNAMIC HEATING CONDITIONS

Cheboksary FIZIKA GORENIYA I METODY YEYE ISSLEDOVANIYA [The Physics of Combustion and Methods for Investigating It, Collection of Works] in Russian No 4, 1975 pp 24-27

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 2 1976 Abstract No 2.34.159 (resume)]

[Text] The authors investigate the effect of the heating rate on the behavior during heating of systems burning with uniform and nonuniform flame emission. They show that the ignition of uniformly burning systems based on sodium nitrate takes place during heating at any rate. The ignition of nonuniformly burning mixtures based on barium nitrate depends on the heating rate. The authors determine the necessary conditions for the ignition of mixtures based on barium nitrate. References 3.

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USSR

UDC 532.529.5.08

DYUDINA, I. A., and DYUDIN, G. Ya.

MEASUREMENT OF THE CONSUMPTION OF SATURATED STEAM BY STANDARD DIAPHRAGMS

Kazan' MATERIALY NAUCH.-TEKH. KONF. TATAR. RESP. PRAVL. NAUCH.-TEKH. O-VA STROIT. INDUSTRII [Data from the Scientific Technical Conference of the Tatar Republic Management of the Scientific-Technical Society of the Construction Industry] in Russian No 2, 1975 pp 221-223

[From REFERATIVNYY ZHURNAL, ^{TEKH.} in Russian No 2, 1975 pp 221-223
Collection] in Russian No 5, 1976 Abstract No 5G39]

[Text] Values of the correction coefficient in the formula for determining the consumption of saturated steam were obtained experimentally for moisture contents to 30% (by mass). The research was done in a pressure range to 4 bar for the laminar, cyclic, and emulsive flow regimes of the steam-water mixture in the diaphragms with a modulus from 0.1 to 0.4. References 1.

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USSR

SAFINA, D. S.

STUDY OF THE HEAT TRANSFER OF A FLAT HORIZONTAL SURFACE IN CLOSED VOLUMES

TR. SAMARKAND. UN-TA in Russian 1975, No. 275 pp 47-56

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No. 7B472 by the author]

[Text] An experiment is performed to determine the heat transfer coefficient of a flat horizontal surface, turned upward and downward, located in a closed volume. The results produced are processed by the method of mathematical statistics and compared with the heat transfer coefficients calculated theoretically by formulas. The good agreement makes it possible to recommend the theoretical formulas for calculation of the heat transfer coefficient of a flat horizontal surface in closed volumes for practical use. 5 references.

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USSR

UDC 536.248.2.001

LUNEVA, L. A. and MAKAROV, A. M., Moscow

METHOD OF SOLVING SEMI-INVERSE PROBLEMS OF STEFAN WITH A NONLINEAR OPERATOR OF THERMAL CONDUCTIVITY

Moscow IZVESTIYA AN SSSR, ENERGETIKA I TRANSPORT in Russian No 3, May-Jun 76 pp 79-85 manuscript received 4 Oct 74

[Abstract] The authors suggest a method for an approximate solution to the semi-inverse nonstationary problems of Stefan type with a nonlinear operator of thermal conductivity; formulation of this problem is characteristic in that the condition at the unknown boundary contains an unknown dependence of the position of the interface of the phases on time, which is of interest for technical applications; this is particularly true for studying problems of optimal control of systems with distributed parameters. Figures 2; references 14: 10 Russian, 4 Western.

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USSR

UDC 536.3.001.24

SURINOV, YU. A., Moscow

CONCERNING AN ITERATION ZONAL METHOD OF INVESTIGATING AND COMPUTING THE LUMINOUS HEAT EXCHANGE IN AN ABSORBING AND SCATTERING MEDIUM

Moscow IZVESTIYA AN SSSR, ENERGETIKA I TRANSPORT in Russian No 3, May-Jun 76 pp 97-125 manuscript received 28 Nov 74

[Abstract] The authors give the theoretical bases and the structure of three basic forms of the iteration zonal method of solving a system of integral equations of radiation describing the generalized formulation of the problem on luminous heat exchange in radiating systems filled with an absorbing and scattering medium. They introduce new characteristics of luminous heat exchange. They formulate and prove the general theorem which is basis of the construction of this method that permits determining the local and averaged characteristics of the radiation field within the limits of the corresponding boundary and volume zones of the radiating system. References 10: 10 Russian.

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USSR

UDC 536.24.001.24

SOZIN, YU. A., Dnepropetrovsk State University

THE PHASE EFFECT OF PULSATING HEAT TRANSFER NEAR A THIN WALL

Minsk IZVESTIYA VUZOV ENERGETIKA in Russian No. 6, 1976 pp 96-102 manuscript received 20 Jun 75

[Abstract] A study is made of some of the peculiarities of heat transfer from a thin wall to a pulsating stream of liquid, when a low frequency harmonic component is added to the constant velocity. A wall is considered thin if its thickness is several times less than the length of a temperature wave in the wall corresponding to the frequency of pulsations of the stream. The temperature head between the thin wall and liquid is determined for a constant thermal load. It is shown that these pulsations in heat transfer factor α lead to a decrease in the mean heat transfer due to a phase shift in the fluctuations of α and the temperature head θ . Graphs are presented of the dependence of phase shift and amplitude of oscillations of θ , as well as the degree of reduction of the mean heat transfer on amplitude of oscillations α and relative wall thickness δ/Λ , where Λ is the length of the temperature wave in the wall.

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USSR

UDC 536.2

SIROTA, A. M., LATUNIN, V. I., BELYAYEVA, G. M., GOL'DSHTEYN, I. I.,
All Union Institute of Heat Engineering

EXPERIMENTAL STUDY OF THE MAXIMA OF HEAT CONDUCTIVITY OF WATER IN THE
CRITICAL AREA

Moscow TEPL O ENERGETIKA in Russian No. 6, Jun 76 pp 84-88

[Abstract] This article is based on earlier published data produced by the authors' Institute on the heat conductivity of water in the 350-400 C temperature range. These data cannot be directly used in heat engineering calculations due to the extremely complex form of the variation in parameters as a function of temperature and pressure. Therefore, the data are presented in this article in smooth graphic form, isobars of $\Delta\lambda(\rho)$ are constructed, the anomalous portion of heat conductivity is calculated, $\Delta\lambda_a(\rho)$ isobars are constructed, $\Delta\lambda_a(T)$ isochors are constructed, $\Delta\lambda_a(\rho)$ isotherms are constructed and the values of $\Delta\lambda_a$ are determined for equal values of ρ and T , then $\Delta\lambda_a(\rho, T)$ is converted to $\lambda(\rho, T)$ and presented in tabular form, recommended for engineering calculations.

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USSR

UDC 621.181.018.77:662.75.001.5

YABLOKOV, S. I., GUS'KOV, A. G., KALININA, N. V. and KOVAL', A. A.

ON THE QUESTION OF CONVERTING INDUSTRIAL STEAM BOILERS TO USE
LIQUID PRODUCTS OF PYROLYSIS OF OIL SHALE

Saratov ISSLED V OBL KOMPLEKS ISPOL'Z TOPLIV [Investigation in
the Field of the Overall Utilization of Fuels, Collection of Works]
in Russian, No 3, 1975 pp 141-145

[From REFERATIVNYY ZHURNAL, TEPL O ENERGETIKA No 4 1976 Abstract No
4R29]

[Text] The authors cite the results of a theoretical investigation of the thermal operation of industrial steam generators of the electric power plant in the town of Slanets with a productivity of 6.5, 14 and 18 t/h during transition of them from burning of the dust of Gdov shales into shale oil. They concluded that the new fuel leads to an increase in the amount of heat transmitted by radiation, and causes a change in the hydrodynamic conditions of the operation of the circulation loop. The efficiency of the boilers is increased from 83 - 84% to about 90.5%. The sanitary and health conditions of operation of the power plant are improved. Tables 2; references 3.

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USSR

UDC 621.181:697.326:662.767.004.15

NOSOVITSKIY, A. YA.

TECHNICO-ECONOMIC BASIS OF THE EFFICIENCY OF GAS SMALL METRIC AREA BOILERS

SAN TEKHNIKA. RESP MEZHVED NAUCH-TEKHN SB [Sanitary Technology. Republic Interdepartmental Scientific-Technical Conference] in Russian, No 15, 1975 pp 97-100

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 4 1976 Abstract No 4R51]

[Text] The author obtains values of the optimal efficiencies of developed gas small metric area boilers, the basis of construction of which is the block principle, when each neighboring pair of sections with a torch for infrared radiation placed between them forms a block of thermal productivity of 10 Mcal/h. For a cast iron boiler KChM-GS with a thermal productivity of 10 to 15 Mcal/h with a number of sections from 2 to 6 the optimal efficiency is from 89.2 to 91%, respectively. For an analogous steel boiler with a number of sections from 2 to 6 the optimal efficiency is from 91.9 to 92.8%, respectively. Tables 2.

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USSR

UDC 621.482

ANANYAN, A. L.

HYDROTHERMAL SYSTEMS OF THE ARMENIAN SSR

Moscow VSES NAUCH-TEKHN SOVESHCH. ISPOL'Z TEPLA ZEMLI DLYA PROIZVA ELEKTROENERGII, 1975. TEZISY DOKL [All-Union Scientific-Technical Conference. Utilization of the Earth's Heat for Production of Electrical Power, 1975. Texts of Reports, Collection of Works] in Russian, 1975 pp 149-151

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 4 1976 Abstract No 4S77]

[Text] The author gives the geological and geothermal characteristics of the territory of the Armenian SSR. As a result of the saturation of the rocks of the upper stage with cold fresh waters, the surface appearances of the geothermal waters are almost absent. At a depth of 150-250 m in certain instances one detects geothermal waters of 45-60°C. In the southern regions of Armenia the geothermal waters with a temperature of 40-80°C with a mineralization of 35-40 g/l were detected at a depth of 2600-3100 m.

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USSR

UDC 621.482"313"(47+57)

YEROKHIN, M. N.

PROSPECTS OF UTILIZING THE ESSOV SITE OF THERMAL WATERS ON KAM-
CHATKA

Moscow VSES NAUCH-TEKHN SOVESHCH. ISPOL'Z TEPLA ZEMLI DLYA PROIZ-
VA ELEKTROENERGII, 1975. TEZISY DOKL [All-Union Scientific-Tech-
nical Conference. Utilization of the Earth's Heat for Production
of Electrical Power, 1975. Texts of Reports, Collection of Works]
in Russian, 1975 pp 132-133

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 4 1976 Abstract No
4S79]

[Text] In the nonigneous deposits of the Essov site of thermal
waters (Kamchatka) 5 wells were drilled to a depth of 220-230 m.
In two wells exploitational resources of thermal waters were re-
vealed, comprising 45 l/s at a temperature of 75°C, excess pres-
sure at the opening of 0.3 kgs/cm² and mineralization less than
1 g/l. The site is promising for construction of a geothermal
power plant, ensuring electrical supply for the Bystrinsk national
region.

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USSR

UDC 536.423.1:533.7

LEVANSKIY, V. V. and PAVLYUKOVICH, N. V.

TOWARD A LAW OF MOTION OF THE FRONT OF EVAPORATION IN CAPILLARY
POROUS BODIES

Minsk VOPR KINETIKI PROTSESSOV TEPLA- I MASSOOBMENA [Questions in
the Kinetics of the Processes of Heat and Mass Exchange, Collec-
tion of Works] in Russian 1975, pp 106-119

[From REFERATIVNYY ZHURNAL, AVIATIONNYYE I RAKETNYYE DVIGATELI
No 4 1976 Abstract No 4.34.5]

[Abstract] The authors find expressions for the dependence of
rate of motion of the front of evaporation in time both for a po-
rous body modeled by a "dusty gas" and for a single capillary in
the case of a freely molecular mode of vapor flow. Here they
used the previously obtained results of an investigation on the
kinetics of the flow of vapor in a capillary of finite length and
in a porous body. They demonstrate that in particular with large
times t the rate of motion of the front of evaporation is propor-
tional to $1/5$ or to $1/\sqrt{t}$, depending on whether evaporation on the
walls of the capillary is taken into account or not. References
10. Authors' abstract.

SERGIYENKO, A. S. and KULESHOV, N. M.

REGION OF EQUILIBRIUM STATES OF A LINEAR DC PLASMOTRON

Minsk VYSOKOTEMPERATUR TEPLA- I MASSOPERENOS [High-Temperature Heat and Mass Transport, Collection of Works] in Russian, 1975 pp 120-128

[From REFERATIVNYY ZHURNAL, AVIATIONNYYE I RAKETNYYE DVIGATELI No 4 1976 Abstract No 4.34.149]

[Text] The authors give the results of an experimental investigation on the region of stable operating modes of a dc plasmotron of a linear circuit. They give an analysis of the features of the limiting working states of the plasma generator as a function of the stability of ignition and duration of combustion. The obtained empirical dependences allow approximating the boundaries of the zone of stable operation with a good degree of accuracy. Figures 4; references 10. Authors' abstract.

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USSR

OVSEPYAN, K. KH

METHOD OF APPROXIMATE SOLUTION OF THE DIFFERENTIAL EQUATION OF AN ELASTIC
HYDRAULIC SHOCK

Yerevan IZVESTIYA AN ARMYANSKOY SSR in Russian No. 1, 1976, pp 37-41

[abstract] A linear second order differential equation is suggested for the calculation of an elastic hydraulic shock. In the equation the elastic properties of the water and the material of the pipe are considered. The equation can be used for analytic studies of transient processes in hydraulic units and for mathematical modeling. Formulas are produced for the calculation of the hydraulic shock and pressure changes with time.

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USSR

UDC 621.694.2(533.54)

SPIRIDONOV, YE. K., TEMNOV, V. K., Chelyabinsk Polytechnical Institute

CHARACTERISTICS OF A VALVE EJECTOR

Minsk IZVESTIYA VUZOV ENERGETIKA in Russian No. 6, 1976 pp 110-115
manuscript received 8 Aug 75

[Abstract] An analytic study is presented of the effectiveness of the process of ejection of a discontinuous stream using a model of an ejector with identical transverse dimensions of the nozzle and working chamber, containing check valves in the passive flow line. Based on the assumption of homogeneity and incompressibility of the active and passive fluids, instantaneous switching of the active stream valve and instantaneous operation of the check valve, the change in velocity in the working chamber of the ejector and the coefficient of ejection of the apparatus is calculated. It is proven that with identical pressure drops, an ejector with a discontinuous stream can produce higher ejection factors than an ejector with a continuous stream, particularly at high Strouhal numbers. Experimental results agree satisfactorily with the calculated characteristics of the valve-type ejector.

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USSR

UDC 536.25: 532.526.4

SOLOVIN, V. I., and VOLOBUYEV, A. N.

NUMERICAL SOLUTION OF THE PROBLEM OF TURBULENT FLOW AND MASS TRANSFER IN AN ANNULAR DUCT WITH INJECTION

Moscow IZVESTIYA VUZOV MASHINOSTROYENIYE in Russian No 7, 76 pp 73-76 manuscript received 5 Sep 75

[Abstract] The problem is considered of obtaining the local characteristics of a flow in a vertical annular duct with porous walls and end for which the distribution of velocities and concentrations and fields of static pressure are averaged. Through the internal wall of the annulus is fed a high-density gas (freon-12), and air is fed through the outer wall and the porous end. The averaged flow characteristics are obtained by the solution of the Reynolds equations. A numerical solution is given, and the dependence of the pressure fields on transverse mass flow is analyzed. Certain special aspects of description by the method of finite differences are demonstrated. The solution of the equations was done on the BESM-6 computer by a procedure used by Patankar and Spalding (Heat and Mass Transfer in Boundary Layers, London 1970). Ill 2 Bibl 4

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USSR

UDC 532.522.2

BUYVOL, V. N., LAPIN, V. A., SHEVCHUK, YU. R., Institute of Hydromechanics, Acad. Sci. UkrSSR

THE FORM OF THIN THREE-DIMENSIONAL CAVITIES BEYOND A CIRCULAR DISC IN A WEIGHTED FLUID

Kiev PRIKLADNAYA MEKHANIKA in Russian No. 6, 1976 pp 105-110 manuscript received 22 Nov 74

[Abstract] A system of equations which summarizes the well-known systems of G. V. Logvinovich and YU. F. Zhuravlev is used to define the shape of cavities in a weighted fluid and compare it with the experimental results. It is assumed that the flow of the ideal weighted fluid about a thin cavity is potential. The flow of the fluid about the cavity formed by the circular disc is studied at zero angle of attack. The theoretical and experimental results agree well. The greatest difference is observed in the tail of the cavity. The theory yields results which are more precise the less the level of perturbations of the flow.

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USSR

AGULYKOV, A. V.

SOME RESULTS OF THE INVESTIGATION OF A THREE-DIMENSIONAL TURBULENT STREAM

OBSHCH. I PRIKL. FIZIKA. VYP. 7 in Russian, Alma-Ata 1974, pp 256-262

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No. 7B156 by the author]

[Text] Results are presented from an experimental study of a three-dimensional turbulent stream of an incompressible fluid flowing from a circular nozzle with a canted tip. The mean and pulsation characteristics of the flow are measured. It is found, in particular, that in the plane where the profile of mean velocity is asymmetrical, the coordinates of the points of the velocity maximum and zero value of turbulent friction stress do not coincide. 7 references.

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USSR

UDC 532.525.6

BOZHKO, D.F. (DECEASED), MOZHAYEVA, ZH. P., and ARALOV, A. D.

STUDY OF THE PHYSICS OF FLOW IN THE AREA OF INTERACTION OF AN AXIALLY SYMMETRICAL TURBULENT JET WITH A FLAT BARRIER

Moscow IZVESTIYA VUZOV MASHINOSTROYENIYE in Russian No 7, 76 pp 55-59 manuscript received 3 Oct 75

[Abstract] Results are given of hydrodynamical research on the interaction of an axially symmetrical turbulent jet with a barrier positioned at various angles of attack. Velocity and turbulence profiles were measured, and an explanation is given of how the static pressure is distributed in the boundary layer at the wall. Within the area of the flow gradient the turbulence of the external flow has a strong influence on the velocity profile in the boundary layer at the wall. In the case when the barrier is within the initial portion of the jet and the angle of incidence is 90 degrees the velocity profile is close to laminar. Even in this initial portion of the jet, when the barrier is turned to a certain angle, the velocity profile

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USSR

BOZHKO, D.F., MOZHAYEVA, ZH. P., and ARALOV, A. D., IZVESTIYA
VUZOV MASHINOSTROYENIYE, No 7, 76 pp 55-59

begins to fill out as a result of the increase of turbulent pulsation of the external flow penetrating the wall boundary layer. When the barrier is situated within a certain segment of the jet the velocity profile does not change with a change of angle of attack, since the boundary layer is highly turbulent from the very outset. For high turbulence levels of the external flow, the velocity profile approximates that for turbulent flow along the surface. Ill 3 Bibl 2

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USSR

KLAD'KO, S. R.

CALCULATION OF THE FORM OF THE FREE SURFACE OF A LIQUID IN THE PROBLEM OF
EXCITATION OF WAVES BY A SYSTEM OF PRESSURES WHEN THERE IS A DOCK PRESENT

VYCHISL. MAT. in Russian, Kiev 1975, pp 42-47

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No.
7B38 by A. K. Nikitin]

[Text] On the surface of an ideal, incompressible liquid of depth h is a nonmoving rigid plate occupying area $y=h$, $-\infty < x < \ell$, $-\infty < z < \infty$. Pressure $P(x, z, t) = P_0(x)e^{i(kz - \omega t)}$ is applied to a sector of the free surface $y=h$, $0 \leq x < a$, $-\infty < z < \infty$. There is a Fourier transform for $P_0(x)$. The velocity potential is sought in the form

$$F(x, y, z, t) = \text{Re}\{\phi(x, y)\exp i(kz - \omega t)\}$$

In order to determine the function ϕ , a complex Fourier transform with respect to x with infinite limits is performed. The problem for the transformant is reduced to the functional equation

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KLAD'KO, S. R., VYCHISL. MAT. 1975, pp 42-47

$$\Phi_+(\alpha, h) + K(\alpha) \Phi_-(\alpha, h) = \frac{f(\alpha) \operatorname{ch} \gamma h e^{i\alpha l}}{\gamma \operatorname{sh} \gamma h - \beta \operatorname{ch} \gamma h} \quad (*)$$

$$\Phi_+(\alpha, y) = \int_{-l}^{\infty} \varphi(x, y) e^{i\alpha(x+l)} dx,$$

$$\Phi_-(\alpha, y) = \int_{-\infty}^{-h} \varphi(x, y) e^{i\alpha(x+l)} dx$$

$$f(\alpha) = \frac{i\omega}{g\rho} \int_0^a P_0(x) e^{i\alpha x} dx, \quad \alpha = \sigma + i\tau, \quad \gamma^2 = \alpha^2 + k^2$$

$$\Phi(\alpha, y) = \int_{-\infty}^{\infty} \varphi(x, y) e^{i\alpha x} dx = \frac{f(\alpha) \operatorname{ch} \gamma y}{\gamma \operatorname{sh} \gamma h - \beta \operatorname{ch} \gamma h} - \frac{\beta e^{i\alpha l} \Phi_-(\alpha h)}{\gamma \operatorname{sh} \gamma h - \beta \operatorname{ch} \gamma h} \operatorname{ch} \gamma y, \quad \beta = \omega^2/g \quad (**)$$

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USSR

KLAD'KO, S. R., VYCHISL. MAT. 1975, pp 42-47

$\Phi_-(\alpha, h)$ is found from equation (*) by a method from a work by V. F. Vityuk (Prikl. mat. i mekh., 1972, Vol. 36, No. 4). For the case $P_0(x) = P_0 \sin x/a$, inversion of transformants (**) is used to determine the function $\phi(x, y)$. Then the rise in the free surface is found for the case $l/h \gg 1$. For values of parameters $h=1\text{m}$, $a=2\text{m}$, $\omega=4.43 \text{ sec}^{-1}$, $k=1\text{m}$, $\rho=1025 \text{ kg/m}^3$, $P_0=500 \text{ kg/m}^2$, numerical calculation of the rise in the free surface of the liquid is performed. The results are presented in a table, from which it follows that the rise in the free surface in the zone between the plate and the system of pressures is significantly less than the rise at the corresponding points beyond the area of application of pressures.

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USSR

KONDIR, D. S.

SOME NEW SOLUTIONS OF STABLE CONTACT-HYDRODYNAMIC PROBLEMS

GIDRODINAMICH. TEORIYA SMAZKI I YEYE PRAKT, PRIMENENIYE V TEKHN VUP. 2
in Russian, Kuybyshev, 1974 pp 138-149

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No.
7B106 by the author]

[Text] A study is made of the microcontact-hydrodynamic theory of lubrication; the solution of an isothermal contact-hydrodynamic problem is solved for arbitrary dependence of viscosity of oil on pressure with newtonian behavior of the fluid, as well as the solution of the isothermal and nonisothermal problem for newtonian and nonnewtonian fluids.
7 references.

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ROMANIA

CUNCEV, I., Institute for Technological Research and Design in Transportation

MATHEMATICAL MODEL OF A TRANSSHIPMENT HARBOR

Bucharest REVISTA TRANSPORTURILOR SI TELECOMUNICATIILOR in Romanian No 2,
1976 pp 142-148

[Abstract] A mathematical model is suggested which would permit the optimization in terms of number of berths, efficiency of facilities, seagoing and inland shipping vessels, storage areas, and other factors. The harbor involves a sea sector and a river sector. The author indicates the hypotheses taken into consideration, including the number of berths in the river and sea sectors, the arrivals of sea- and river-going ships, and ship operation time. Also indicated is the system of equations describing the processes which develop in the subsystems considered. Other original hypotheses which may be taken into consideration in developing the harbor model are also discussed. An example is given for the calculation of the efficiency function (optimization criterion). The efficiency function is dependent on the relative cost of the ships' stay in the two subsystems, the relative cost of berth vacancy, the efficiency of berths, the harbor stowage index, the relative cost of storage, and the relative costs of direct and indirect transshipment. For a minimum value of the efficiency function the optimal characteristics of the entire system result.

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USSR

UDC 621.9.048.7

KOVALENKO, V. S., VOLGIN, V. I., Kiev Polytechnical Institute

LASER ALLOYING OF STRUCTURAL MATERIALS

Kiev TEKHNLOGIYA I ORGANIZATSIYA PROIZVODSTVO in Russian No. 7, 1976
pp 60-62 manuscript received 13 Feb 76

[Abstract] Many problems in modern technology require a directed change in the properties of the material within small volumes, for example the surface layers of a part with limited contact area with another part. One method of producing such a local change is alloying of the surface using the energy of laser radiation to saturate the surface of structural materials with the alloying elements. A study was performed using technically pure iron and type SHKH15 steel plus pure Ni, Mo, Ti, Ta, Nb and V as alloying elements. The mechanism of penetration and distribution of the components includes mechanical mixing under the influence of the hydrodynamic forces and temperature gradients and diffusion distribution with the formation of a solid solution. The high cooling rates achieved allow the formation of a supersaturated solid solution without separation of the dissolved elements. The studies performed confirm the possibility of

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KOVALENKO, V. S., VOLGIN, V. I., TEKHNLOGIYA I ORGANIZATSIYA PROIZVODSTVO
No. 7, 1976 pp 60-62

using laser radiation for local surface saturation of structural materials
with alloying elements.

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GAL'PER, R. R., NACHINKIN, V. P., FILATKIN, A. F.

INFLUENCE OF NITRIDING AND HEAT TREATMENT OF GEAR WHEELS ON BENDING
STRENGTH OF THEIR TEETH

Leningrad SUDOSTROYENIYE in Russian No. 6, 1976 pp 26-28

[Abstract] Straight-cut gear wheels were tested on a pulsating test machine, and marine-type chevron transmission gears were tested on a closed reducing test stand at a circumferential speed of 90 m/s (using the mean value between the rupture and pre-fracture loads). The fatigue bending strength of teeth of improved and nitrided steels with a pulsating loading cycle increases linearly with increasing short-term strength of the core up to a tensile strength of 12,000 kg/cm². The experimental values of $\sigma_{Flim\infty}$ agrees closely with the calculated values using the formulas recommended in [9]. With tensile strengths of over 12,000 kg/cm², a sharp drop in bending strength of the teeth of improved and nitrided wheels made of steels types 38KHMUYA and 40KH3N2M2FA is observed. For wheels of 30KH2NVFA steel and steel with a carbon content of 0.12%, the fatigue strength increases linearly throughout the entire range of values of tensile

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GAL'PER, R. R., NACHINKIN, V. P., FILATKIN, A. F., SUDOSTROYENIYE No. 6, 1976

strengths studied, from 7000 to 14,000 kg/cm². The increase in load-bearing capacity of teeth as a result of nitriding depends on the ratio of depth of the nitrided layer δ to normal meshing modulus m . With the optimal depth of the nitrided layer, $\delta/m = 0.08-0.09$, the bending fatigue limit of the teeth increases by 30-40%. For practical calculations, it can be assumed that where $\delta/m = 0.06-0.10$, the bending strength of the teeth will be increased by 20% due to nitriding. With a δ/m ratio of 0.13 to 0.15, the bending strength of the teeth drops sharply and may be lower than the bending strength of improved teeth with the same level of static strength of the core.

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USSR

UDC 621.81.678.5

SHTURMAN, A. A. and REZNICHENKO, T. I.

ON THE QUESTION OF HARDENING OF AST-T PLASTIC SPECIMENS
DURING HEAT TREATMENT

Moscow IZVESTIYA VUZOV MASHINOSTROYENIYE in Russian No 7, 76
pp 116-120 manuscript received 17 Dec 75

[Abstract] Since, in spite of the rapid development in the USSR of polymer production, many polymers in the most recent period of the past do not satisfy the increasing requirements of the national economy, the authors investigated the influence of the optimum mode of heat treatment on the variation of the physical-mechanical and performance properties of specimens made of the plastic AST-T. In the usual heat treatment process the absence of an increase in molecular mass at a depth up to two millimeters indicated that the incorrectly selected "optimum" modes produced temperatures inside the specimens that were lower than on the surface and were thus too low to polymerize the residual monomer. Increasing the heat-treatment time, in order to allow the temperature to reach the entire mass of the specimen, 1/2

USSR

SHTURMAN, A. A. and REZNICHENKO, T. I., IZVESTIYA VUZOV MASHINOSTROYENIYE No 7, 76, pp 116-120

led to increased hardness of the specimen over the entire cross section, but to an abrupt drop in the strength rating (brittleness). Thus surface heat treatment is more important from the point of view of increasing strength properties than heat treatment of the entire mass. Ill 2 Tab 2 Bibl 4

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USSR

UDC 65.012.122:669.1

YERESKOVSKIY, O. S., ZATULOVSKIY, N. M.

AN ALGORITHM FOR SELECTION OF THE MODE OF OPERATION OF BLAST FURNACE AIR HEATERS

Kiev MEKHANIZATSIYA I AVTOMATIZATSIYA UPRAVLENIYA in Russian No. 2, 1976
pp 25-28 manuscript received 11 May 75

[Abstract] The problem of selection of the operating mode of the air heaters of a blast furnace was solved using several methods of nonlinear programming. A modified simplex method was most successful. Calculations performed using the method show that optimization of the mode of operation of the air heater unit allows the fuel consumption to be reduced by 3-5%. In a blast furnace with a volume of 1033 m³, the total economic effect is 100-120,000 rubles per year.

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USSR

UDC 62.505.7

YELIZAROV, V. I.

OPTIMIZATION OF THE ASYMMETRICAL PROCESS OF ROLLING AVIATION MATERIALS

Kazan' IZVESTIYA VUZOV AVIATSIONNAYA TEKHNIKA in Russian
No 2, 76 pp 21-24 manuscript received 26 Feb 75

[Abstract] A method is considered for optimizing the asymmetrical process of rolling certain nonmetallic aviation materials, which in the process react at considerable shear rates in accordance with an exponential rheological law. The controlled parameters of the process include: peripheral velocity, roll surface temperature, temperature of the preheated material, and depth of gap loading, which are determined from the condition of maximum productivity of the rollers for a limited value of the quadratic deviation of flow temperature from a given distribution. The given distribution of temperature by layer of material characterizes the quality of the rolled work.
Ill 1 Bibl 2

1/1

USSR

UDC 621.74

SITIN, V. I., and RYBKIN, V. A.

STUDY OF THE MANUFACTURE OF MINIATURE FERRITE-CERAMIC COMPOSITES

Moscow IZVESTIYA VUZOV MASHINOSTROYENIYE in Russian No 7,76
pp 114-116 manuscript received 2 Jul 75

[Abstract] Authors examine the technological process of manufacturing ferrite-ceramic composites 1.5-2.0 mm thick by the hot-pressing method, and the factors that influence the fusion line configuration of the two components. The base materials were ZSCh-15 ferrite and a lanthanum-aluminate calcium-titanate ceramic, both of which are widely used in radio engineering, to which, for this investigation, CuO , CaF_2 , V_2O_5 , and others, were added to enhance the tensile strength and hot hardness. During hot pressing the size of the diffusion layer increases intensively during the first five minutes, then increases at a reduced rate. The fusion line configuration depends on the method of doping the ferrite and ceramic in the cold-pressing form. Doping through a fine mesh produces a straight fusion line. Ill 3 Bibl 3

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ROMANIA

UDC 621.785.53;620.178.1

NITA, D., Machine Tools and Aggregates Enterprise, Bucharest

NITRIDATION WITH DISCHARGES THROUGH GAS, A NEW SURFACE HARDENING PROCESS

Bucharest CONSTRUCTIA DE MASINI in Romanian No 1, 1976 pp 50-53

[Abstract] A description is given of the "ionitridation" process which, due to the special procedure for nitrogen incorporation into the surface layer of steel and cast iron ensures mechanical and technological features which are superior to those achieved in conventional nitridation. The process results in a 3-4 times greater productivity. A nitridation facility and its operation are described. Emphasis is placed on the combination and melting zones. The mechanical twisting tests carried out on nitridated specimens and ionitridated specimens for the identical layer thickness and strength indicated that the last-mentioned had a higher ductility and the maximum twisting angle was 97° versus 25° for the control specimen. The new process eliminates the homogenization fans and brickwork for heat insulation. Figures 8.

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ROMANIA

UDC 621.78;669.14

BAICU, S., Technological Research and Design Institute for Hot-Metalworking Sectors

HEAT TREATMENT OF 18% Ni MARAGING STEEL

Bucharest CONSTRUCTIA DE MASINI in Romanian No 1, 1976 pp 11-19

[Abstract] Laboratory tests conducted in order to study specific matter of heat treatment of 18 Ni-8 Co-5 Mo-0.5 Ti maraging steel resulted in the following conclusions: a. When heating 18% maraging steel for placing in solution, temperatures between 650 and 750°C must be avoided in order to prevent the formation of reversion austenite. The recommended temperature involved is 820°C for 1 hour; b. In aging, a significant hardening during several minutes was noted for temperatures of 480° or 540°C. The temperature of 480°C for 3 hours is recommended for aging (variations of 2-10 hours do not change the strength of steel); c. Overheating after maraging in the range 540-750° for periods of 30 minutes results in large amounts of reversion austenite (~50%) concurrently with the reduction of the original toughness, which, however, can be recovered by renewed placing in solution at 820°C and a new maraging at 480°C; d. By the analysis of the precipitation stages

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ROMANIA

BAICU, S., CONSTRUCTIA DE MASINI No 1, 1976 pp 11-19

which are involved in the hardening of 18% Ni maraging steel by aging, the Ni_3Ti intermetal compound was identified by electron diffractions. Figures 11; references 13.

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ROMANIA

UDC 669.162.275.2;546.821

TALOI, D., and BUZATU, M., Polytechnical Institute, Bucharest

CONSIDERATIONS ON THE THERMODYNAMICS AND KINETICS OF TITANIUM SLAG
CHLORINATION REACTIONS

Bucharest METALURGIA in Romanian No 5, 1976 pp 259-264

[Abstract] In a reducing medium chlorination develops at sufficiently high rates and efficiency of over 95% are obtained. In the absence of an excess of coke (in light of the stoichiometry required) the efficiency of the process does not exceed 75%, with significant increases obtained only when the excess is above 10% ($\eta > 90\%$). The maximum efficiency of 95.5% was obtained for a coke excess of 20%. Chlorination develops with sufficiently high rates ($\eta > 85\%$) even from temperatures of 750°C , recording a continuous rise as temperature goes up and approaches 90°C . As for the kinetics of the process, it was found that the optimal duration of the process is 2.5 h. The increase in the duration above this limit results in insignificant rises in efficiency.

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ROMANIA

UDC 621.78;669.14

VASILOIU, A., SAVESCU, A., Technological Research and Design Institute for Hot-Metalworking Sectors, Bucharest, and FILIP, I., ISIM, Timisoara

BELOW ZERO TREATMENT OF 90 MoVC 18 STEEL

Bucharest CONSTRUCTIA DE MASINI in Romanian No 1, 1976 pp 19-24

[Abstract] In order to achieve proper contact fatigue resistance, high strength associated with residual austenite for controlling an optimal alloy of the mold is required. This survey deals with experimental results which focused on answering the question whether below zero treatment can simultaneously increase the strength and contact fatigue resistance of steel for rolls for cold-rolling metals. Below zero treatment had an adverse effect on pitting resistance when tempering was done at low temperature (100°C). The effect of below zero cooling was not always associated with secondary hardening but the testers noted the constant change in the slope of distribution of toughness to the fatigue test. This aspect might have resulted from the martensite becoming brittle during cooling below 0°C.

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Materials

USSR

UDC 620.178.3: 184.6: 186.8: 187.24

STRIZHALO, V. A., STEPANENKO, V. A., and RUBEL', A. P.
(Institute of Strength Problems, Academy of Sciences Ukrainian SSR)

ON LOW-TEMPERATURE LOW-CYCLE FATIGUE OF STRUCTURAL STEEL

Kiev PROBLEMY PROCHNOSTI in Russian No 7, 76 pp 10-15
manuscript received 18 Aug 75

[Abstract] It is shown that, in pulsating low-cycle (1 Hz) loading of structural steel 15G2AFDps at minus 140°C the change in type of macrofracture within the range of 0.5 to $2 \cdot 10^5$ cycles (determined by the discontinuity on the low-cycle fatigue curves) is associated with a change in the type of fracture surface, which is studied here by electron microscope fractography. It is found that, with respect to fatigue cracking, there is no principal difference between low-cycle fatigue and high-cycle fatigue at low temperatures in the case of 15G2AFDps steel. Tab 1 Ill 6 Bibl 25

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USSR

UDC 621.9.048.3

KUSLITSKIY, A. B., and PISTUN, I. P. (Ukrainian Polygraphic Institute and Physics and Mathematics Institute, Academy of Sciences Ukrainian SSR, L'vov)

INFLUENCE OF SURFACE COLD HARDENING ON THE SERVICE LIFE OF HIGH STRENGTH STEEL

Kiev PROBLEMY PROCHNOSTI in Russian No 7, 76 pp 111-112
manuscript received 1 Apr 75

Abstract The authors consider the influence of vibration hardening on the service life of 30KhGSNA steel in air and in a hydrogenating medium. It is shown that the use of optimum modes of surface vibrohardening can greatly increase the service life of this steel, particularly in the hydrogenating medium (8.5 times in the latter against twice in air). Tab 1 Ill 2 Bibl 7

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USSR

UDC 539.319

KABELEVSKIY, M. G., and STOLYAROVA, L. I. (Central Scientific Research Institute of Machinery-Manufacturing Technology, Moscow)

ON THE DETERMINATION OF THERMAL FATIGUE STRENGTH OF ROTOR STEEL UNDER CONCENTRATED LOADING

Kiev PROBLEMY PROCHNOSTI in Russian No 7, 76 pp 89-93
manuscript received 27 Nov 74

[Abstract] Experimental data are given on the thermal fatigue characteristics of rotor steel R2M (% 0.29C; 0.29Si; 0.51Mn; 0.012S; 0.013P; 1.75Cr; 0.21Ni; 0.94Mo; 0.28V; 0.14Cu) for theoretical coefficients of stress concentration from 3.4 to 14.8, and the results of an observation of the generation and growth of thermal fatigue cracks. The R2M test specimens were flat 300-mm dia, 40-mm thick disks with eight axial gaps 10 mm deep. The stresses, in kg/mm², for different deformations (percentage elongations) and temperatures were as follows:

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KABELEVSKIY, M. G., and STOLYAROVA, L. I., PROBLEMY PROCHNOSTI No 7, 76 pp 89-93

Temp °C	E, %						
	0.2	0.5	1	2	4	6	10
250	38.5	42.5	45.6	49.6	53.8	56.5	58.0
520	37.0	41.4	44.0	47.0	51.7	52.5	55.4

Tab 4 Ill 5 Bibl 10

2/2

USSR

UDC 621.186.7.621.774.1

GLADSHTEYN, V. I., Engineer and SHESHENEV, M. F., Candidate of Technical Sciences, All-Union Heat Engineering Institute

INFLUENCE OF THE PROPERTIES OF METAL OF CAST PARTS OF 15Kh1M1FL STEEL ON THE RESISTANCE TO GROWTH OF CRACKS AT 565° C

Moscow TEPLOENERGETIKA in Russian No 4, 1976 pp 84-86

[Abstract] The authors found that a relationship exists between the level of the standard properties and resistance to development of cracks. With change in the structure and properties of 15Kh1M1FL steel in the process of exploitation the rate of growth of small cracks is decreased by almost three orders of magnitude. Subsequent structural changes in the process of lengthy exploitation lead to a gradual increase in the rate of growth of the cracks. At the same time the resistance to onset of an unallowably high rate of crack growth is monotonically decreased with increase in time of operation. Metal from industrial castings of 15Kh1M1FL steel possesses a good resistance to crack development in the case when it has sufficient heat resistance and a satisfactory

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USSR

GLADSHTEYN, V. I. and SHESHENEV, M. F., TEPLOENERGETIKA, No 4, 1976 pp 84-86

local plasticity. The yield stress of the metal of the castings from this steel subjected to heat treatment according to the recommended mode under plant conditions must be in the range from 30 to 50 kgs/mm². Figures 4; references 5: 3 Russian, 2 Western.

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USSR

UDC 621.438

MOROZOV, B. I., VOROSHILOV, V. P.

NEW HEAT AND SOUND INSULATION FOR GAS TURBINE INSTALLATIONS

POVYSHENIYE EFFEKTIVN. TRANSP. GAZA in Russian, Moscow 1975 pp 45-52

[Translated from REFERATIVNYY ZHURNAL 49. TURBOSTROYENIYE No. 4, 1976
Abstract No. 4.49.115]

[Text] The All Union Scientific Research Institute for Gas, in cooperation with "Soyuzenergozashchita" Union has performed work on the selection and testing of a new type of gas turbine insulation. The optimal version selected is asbestos insulation applied by spraying. The basic components of the insulation are asbestos, potassium liquid glass and cement. When applied to a surface with an operating temperature of over 450 C, perlite sand is added. The asbestos heat insulation has high thermal stability (up to 600 C). It is simultaneously good sound insulation due to its porous structure and high damping capacity. The insulation operates reliably under conditions of vibration of the insulated surfaces. Technical characteristics are: at 20 C, compressive resistance 0.1 kg/cm², shear

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USSR

MOROZOV, B. I., VOROSHILOV, V. P., POVYSHENIYE EFFEKTIVN. TRANSP. GAZA
1975, pp 45-52

resistance 1-1.2 kg/cm², delamination resistance 0.08-0.1 kg/cm²; heat conductivity factor not over the values determined by the formula $K=0.0612+0.0007 \text{ kcal/cm}^2 \cdot \text{C}$; the volumetric mass of insulation is between 140 and 2000 kg/m³. The results of testing have shown that a layer of the insulation 50 mm thick, with a noise level of the surface studied of 100-120 db in the frequency range most dangerous to man (1000-3000 Hz) reduces the sound level by 15-20 db. The technology of application of insulation is presented and the TSMKH-1 installation for its application is described. 2 figures; 1 table.

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CHUVAYEVA, T. I., PODUSHKO, YE. V.

THE NATURE OF COLORATION OF TITANIUM-CONTAINING SITALLIZING GLASSES

Leningrad OPTIKO MEKHANICHESKAYA PROMYSHLENNOST' in Russian No. 5, 1976
pp 40-43 manuscript received 24 Jul 75

[Abstract] Results are presented from spectroscopic investigation of lithium aluminum silicate glasses with TiO_2 and ZrO_2 , containing iron ions as impurities. Sitallizing glass of the following composition was studied (mol.%): SiO_2 -- 73, Al_2O_3 -- 15, Li_2O -- 12. The crystallization catalysts were introduced above 100 mol.% in a quantity of 4 mol.% TiO_2 or 3.5 mol.% ZrO_2 . The content of Fe_2O_3 in the glasses varied between 0.008 and 3.0 wt.%. All glasses were melted at 1580 C in the presence of oxidizers. The initial glasses were studied, as well as glasses subjected to various types of heat treatment. The absorption spectra were studied in the area of 200-600 nm for specimens of various thicknesses (0.2-1 mm). The spectra were compared for a thickness of 0.2 mm. It is shown that the absorption of lithium aluminum silicate glasses with TiO_2 in the visible and near UV areas results from the process of charge transfer primarily

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USSR

CHUVAYEVA, T. I., PODUSHKO, YE. V., OPTIKO MEKHANICHESKAYA PROMYSHLENNOST' No. 5, 1976 pp 40-43

in pairs of iron ions. The number of such pairs increases sharply with introduction of titanium dioxide in comparison to the mean statistical number in glasses without TiO_2 . Heat treatment, facilitating ion diffusion, leads to a still greater increase in pairs of ions of iron and to an increase in coloration. Furthermore, heat treatment causes additional absorption in the area of wavelengths shorter than 390 nm, resulting from titanium ions.

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USSR

UDC 539.538

CHATYNYAN, L. A., LASHKO, N. F., BABURINA, YE. V., KOZLOVA, M. N.,
BELOVA, YE. V. and DMITRIYEVA, L. I., Moscow

INFLUENCE OF SILICON ON THE WEAR RESISTANCE OF HEAT-RESISTANT NICKEL ALLOYS SUCH AS VZHL-2 DURING FRICTION UNDER HIGH-TEMPERATURE CONDITIONS

Moscow MASHINOVEDENIYE in Russian No 4, Jul-Aug 76 pp 102-106 manuscript received 20 Sep 74 and 2 Jul 75

[Abstract] The authors cite data on the influence of the silicon doping of nickel complexly doped alloys on the formation of solid wear-resistant carbide and intermetallide components and the wear-resistance of alloys under high-temperature conditions. Depending on the amount of the basic doping element (Mo, W, Cr), certain carbide components are formed in the presence of silicon which become the main ones in the structure of the alloy. The authors established that silicon in alloys of these compositions facilitates separation of the support components in the form of intermetallides such as M'_2M'' or $M'_7M''_6$ and also appears in the composi-

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USSR

CHATYNYAN, L. A., LASHKO, N. F., BABURINA, YE. V., KOZLOVA, N. M.,
BELOVA, YE. V. and DMITRIYEVA, L. I., MASHINOVEDENIYE No 4, Jul-Aug 76 pp 102-106

tion of the binary carbide and facilitates the formation of dense wear-resistant surface films which possess a high degree of cohesiveness with the base material. Figures 2; tables 2; references 4: 4 Russian.

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USSR

UDC 629.7.036.3:621.89.001.4(088.8)

GRIGOR'YEV, P. F., TRET'YAKOV, P. P., VAKHMYANINA, M. M. and TRU-
SENEV, M. G., State Scientific Research Institute of Civil Avia-
tion

METHOD OF ESTIMATING THE TENDENCY OF LUBRICATING OILS TO COKE FOR-
MATION

AVT SV SSSR [USSR Patent] in Russian, k1 G 01 n 33/30, No 469085,
Announced 3 Jan 74, Published 24 Jul 75

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI
No 5 1976 Abstract No 5.34.15P]

[Text] The authors have patented a method of estimating the tend-
ency of lubricating oils to coke formation by oxidation of the oil
pumped through a discharge nozzle at elevated temperature.
For the purpose of increasing the accuracy of the evaluation the
oil is pumped cyclically through the discharge nozzle with subse-
quent heating of the nozzle in each cycle up to a temperature that
exceeds the coking temperature of the test oil and cooling of the
nozzle to the original temperature and from the change in the

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USSR

GRIGOR'YEV, P. F., TRET'YAKOV, P. P., VAKHMYANINA, M. M. and TRU-
SENEV, M. G., AVT SV SSSR, k1 G 01 n 33/30, No 469085, Announced
3 Jan 74, Published 24 Jul 75 [From REFERATIVNYY ZHURNAL, AVIATS-
IONNYYE I RAKETNYYE DVIGATELI No 5 1976 Abstract No 5.34.15P]

amount of oil pumped through the nozzle per unit of time they
judge as to the tendency of the oil to coke formation. Figure 1.
Authors' abstract.

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ZAYMOVSKIY, A. S., BYKOV, V. N., VOROB'YEV, A. N., DMITRIYEV, V. D., MEN'SHIKOVA, T. S., NIKULIN, A. D. and SHCHERBAK, V. I.

INFLUENCE OF IRRADIATION ON THE MECHANICAL PROPERTIES, STRUCTURE AND SWELLING OF 1KH18N10T AND OKH16N15MEV STEELS

Obninsk SOSTOYANIYE I PERSPEKTIVY RABOT PO SOZDANIYU AES S REAKTORAMI NA BYSTRYKH NEYTRONAKH. T 2 [State and Prospects of Research on Creating an Atomic Electric Power Plant With Fast-Neutron Reactors. Vol 2, Collection of Works] in Russian, 1975 pp 583-602

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 3 1976 Abstract No 3U168 by G. I. Korotkina]

[Text] The authors give the results of an investigation on the influence of irradiation in the active zone of the BR-5 nuclear reactor on the mechanical properties, structure and swelling of 1Kh18N10T and OKh16N15M3B steels with different treatment. They give the chemical composition of the steels. Billets in the shape of bands of 1Kh16N10T and 016N15M3B steels were treated by the following regimes: for the 1Kh16N10T steel: A -- austenization

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USSR

ZAYMOVSKIY, A. S., BYKOV, V. N., VOROB'YEV, A. N., DMITRIYEV, V. D., MEN'SHIKOVA, T. S., NIKULIN, A. D. and SHCHERBAK, V. I., SOSTOYANIYE I PERSPEKTIVY RABOT PO SOZDANIYU AES S REAKTORAMI NA BYSTRYKH NEYTRONAKH. T 2, 1975 pp 583-602 [From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 3 1976 Abstract No 3U168]

from 1050°C; B -- cold deformation by 15, 20, 35 and 50%; C -- cold deformation by 15, 20, 35 and 50% with subsequent annealing at 600°C for a period of 1 hour. For the OKh16N15M3B steel: A -- quenching from 1050°C; B -- cold deformation by 7, 20, 40 and 60%; C -- cold deformation by 7, 20, 40 and 60% and subsequent annealing at a temperature of 800°C for a period of 1 hour. Irradiation was done in the active zone of the BR-5 nuclear reactor at a temperature of 450 -- 500°C with integral neutron fluxes of $2.6 \cdot 10^2$ neutron/cm² and $1 \cdot 10^{22}$ neutron/cm². The average neutron energy equalled 0.38 MeV, the amount of neutrons with E greater 1 MeV was 30%. They give the experimental results, characteristics of the investigated samples and the amounts of swelling. Figures 6; tables 3; references 13.

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USSR

UDC 621.039.526:621.039.53

AGAPOVA, N. P., ANUCHKIN, A. M., BOGOLEPOV, M. G., IOLTUKHOVSKIY, A. G., MEDVEDEVA, YE. A., MITROFANOVA, N. M., SAFRONOVA, A. D. and SERGEYEV, V. S.

CHANGE IN THE STRUCTURE AND PROPERTIES OF OKh16N15M3B STEEL DURING PROLONGED CONTACT WITH A CURRENT OF SODIUM

Obninsk SOSTOYANIYE I PERSPEKTIVY RABOT PO SOZDANIYU AES S REAKTORAMI NA BYSTRYKH NEYTRONAKH. T 2 [State and Prospects of Research on Creating Atomic Electric Power Plants With Fast-Neutron Reactors. Vol 2, Collection of Works] in Russian, 1975 pp 363-383

[From REFERATIVNYY ZHURNAL, TEPLONERGETIKA No 3 1976 Abstract No 3U174 by G. I. Korotkina]

[Text] The authors discuss a study of the properties of the material of a pipeline (OKh16N15M3B steel) for a sodium nonisothermal loop which has operated for 24,000 h at a maximum temperature of 720 to 820°C, including an investigation of the chemical and gaseous composition of the steel, as a function of the exploitative conditions. They investigated the phenomena of mass trans-

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USSR

AGAPOVA, N. P., ANUCHKIN, A. M., BOGOLEPOV, M. G., IOLTUKHOVSKIY, A. G., MEDVEDEVA, YE. A., MITROFANOVA, N. M., SAFRONOVA, A. D. and SERGEYEV, V. S., SOSTOYANIYE I PERSPEKTIVY RABOT PO SOZDANIYU AES S REAKTORAMI NA BYSTRYKH NEYTRONAKH. T 2, 1975 pp 363-383 [From REFERATIVNYY ZHURNAL, TEPLONERGETIKA No 3 1976 Abstract No 3U174]

port in the loop and their influence on behavior of the material. They distributed the temperatures in the sodium loop for two modes of exploitation. They established that for long durations of testing, segments of the high-temperature part of the loop made of OKh16N15M3B steel may be decarbonized in spite of the presence in the composition of the steel of a strong carbide-forming element of niobium. The results obtained show that doping of austenitic chrome-nickel steel 016N15M3B with a strong carbide-forming element prevents decarbonization of this steel at temperatures up to 800°C, whereas unstabilized steels such as 316SS, 304SS and others are notably decarbonized at temperatures greater than or equal to 650°C. Figures 8; tables 4; references 9.

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USSR

UDC 621.039.526:621.039.53

ILINCHEV, G., MAYER, F. and FRESL, M.

PROPERTIES OF STABILIZED CHROME-MOLYBDENUM STEELS FOR STEAM GENERATORS OF FAST-NEUTRON REACTORS WITH A SODIUM HEAT CARRIER

Obninsk SOSTOYANIYE I PERSPEKTIVY RABOT PO SOZDANIYU AES S REAKTORAMI NA BYSTRYKH NEYTRONAKH. T 2 [State and Prospects of Research on Creating Atomic Electric Power Plants With Fast-Neutron Reactors. Vol 2, Collection of Works] in Russian, 1975 pp 425-458

[From REFERATIVNYY ZHURNAL, TEPLONERGETIKA No 3 1976 Abstract No 3U177 by Ye. A. Kremenevskaya]

[Text] The authors investigated the mechanical properties and corrosion resistance of steels on a base of 10Kh2 and 25M1, stabilized with Nb and Ti in various combinations. They determined the influence of oxygen on the transport of carbon during 1000-h tests in liquid sodium containing about $2 \cdot 10^{-4}$ or 3.45 to $6.58 \cdot 10^{-2}$ mass% oxygen. The corrosion resistance was studied at temperatures from 400 to 700° C (800°C for pure sodium). Furthermore,

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ILINCHEV, G., MAYER, F. and FRESL, M., SOSTOYANIYA I PERSPEKTIVY RABOT PO SOZDANIYU AES S REAKTORAMI NA BYSTRYKH NEYTRONAKH. T 2, 1975 pp 425-458 [From REFERATIVNYY ZHURNAL, TEPLONERGETIKA No 3 1976 Abstract No 3U177]

they studied the structural stability of the metals, the mechanical properties and impact viscosity at high temperatures and at 400°C after prolonged heat aging, heat resistance, weldability of the steels and made a microanalysis and phase analysis of the carbides. The tests conducted showed that the investigated steels are distinguished by a low activity of carbon, therefore, they do not decarbonize under the effect of liquid sodium and at high temperatures (up to 600 to 700°C) also do not cause carbonization of the stainless chrome-nickel steels. The mechanical and technological properties of the stabilized steels were compared with the properties of the unstabilized steel type 10Kh2M and were satisfactory up to a temperature of 575°C. This makes it possible to use them as structural material for steam generators in high-speed reactors for the purpose of raising their working parameters and efficiency. Figures 10; tables 2; references 15.

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USSR

UDC 621.039.526:621.039.53

BYKOV, V. N., DMITRIYEV, V. D., KOSTROMIN, L. G., POROLLO, S. I.
and SHCHERBAK, V. I.

INVESTIGATION OF THE RADIATION POROSITY IN MATERIALS OF REGULAR
PACKETS OF THE REACTOR BR-5

Obninsk SOSTOYANIYE I PERSPEKTIVY RABOT PO SOZDANIYU AES S REAK-
TORAMI NA BYSTRYKH NEYTRONAKH. T 2 [State and Prospects of Re-
search on Creating ATomic Electric Power Plants With Fast-Neu-
tron Reactors. Vol 2, Collection of Works] in Russian, 1975 pp
626-666]

[From REFERATIVNYY ZHURNAL, TEPLONERGETIKA No 3 1976 Abstract No
3U178]

[Text] The authors discuss the results of an electron microscopic
investigation of the radiation porosity in steels OKh18N9T, 1Kh18-
N10T, 00Kh16N15M3B and OKh16N15M3B for regular packets of the BR-5
nuclear reactor. They give and discuss the temperature and dose
dependences of the swelling of these steels. They give a brief
survey of the latest research on investigating the radiation poros-

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USSR

BYKOV, V. N., DMITRIYEV, V. D., KOSTROMIN, L. G., POROLLO, S. I.
and SHCHERBAK, V. I., SOSTOYANIYE I PERSPEKTIVY RABOT PO SOZDAN-
IYU AES S REAKTORAMI NA BYSTRYKH NEYTRONAKH. T 2, 1975 pp 626-666
[From REFERATIVNYY ZHURNAL, TEPLONERGETIKA No 3 1976 Abstract No
3U178]

ity in steels and compare the experimental data on the swelling
of different steels. The results of the investigations are pro-
cessed by computer and empirical expressions are obtained for the
swelling of the investigated steels as a function of temperature
and radiation dose. They obtained equations are used for evalu-
ating the swelling of hexahedral cases and shells of fast reactor
fuel cells made of domestic steels with doses of 10^{23} neutron/cm².
Investigations made in recent years on radiation porosity in aus-
tenitic steels showed that radiation of these materials with large
currents of fast neutrons leads to a significant increase in their
volume, which in individual cases may reach 10 to 15%. The cor-
responding volume changes in the individual components of the
high-speed reactor core must be taken into account in planning new
nuclear reactors. Figures 13; tables 2; references 24.

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USSR

UDC 621.039.53:620.193

KHAYEVSKA, E.

CORROSION OF STAINLESS STEEL TYPE 18/8 IN LIQUID SODIUM UNDER
STATIC CONDITIONS

Obninsk SOSTOYANIYE I PERSPEKTIVY RABOT PO SOZDANIYU AES S REAKTORAMI NA BYSTRYKH NEYTRONAKH. T 2 [State and Prospects of Research on Creating Atomic Electric Power Plants With Fast-Neutron Reactors. Vol 2, Collection of Works] in Russian, 1975 pp 407-424

[From REFERATIVNYY ZHURNAL, TEPLONERGETIKA No 3 1976 Abstract No 3U179 by Ye. A. Kremnevskaya]

[Text] The author constructed a special device and investigated the processes of corrosion in steels 1Kh18N9T and OKh17N12M2E in liquid sodium under static conditions in order to find the reasons for the onset of pitting corrosion. She found that pitting corrosion is involved with both of the tested types of steel; pittings are formed at sites in which nonmetallic inclusions such as oxides are found (no pittings were formed on sulfides); several

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USSR

KHAYEVSKA, E., SOSTOYANIYE I PERSPEKTIVY RABOT PO SOZDANIYU AES S REAKTORAMI NA BYSTRYKH NEYTRONAKH. T 2, 1975 pp 407-424 [From REFERATIVNYY ZHURNAL, TEPLONERGETIKA No 3 1976 Abstract No 3U179]

carbonitrides are eluted from the 1Kh18N9T steel, this being explained by the presence of aluminum oxides; the appearance of pittings in the OKh17N12M2E steel is associated with the large amount of nitrogen (ten times greater than in the 1Kh18N9T steel). Figures 9.

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USSR

UDC 621.643.002.2+411.4

RAKHMANOV, A. S., All Union Scientific Research Institute for Trunk Pipelines

PROBLEMS OF WELDABILITY OF PIPES FOR OIL AND GAS PIPELINES

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No. 5, 1976 pp 16-17

[Abstract] The need to reconsider the factors included in the definition of "weldability" has arisen due to qualitative changes which have occurred in recent years in the practice of pipeline construction, significantly influencing its organization and technology. First of all, the volumes of installation of pipes in Siberia and the far north has increased greatly, where continuous-flow operations must be performed in the winter with air temperatures as low as -50°C . Secondly, pipeline diameters have increased from 820-1020 mm to 1220-1420 mm. The pressure of the fluids transported has also increased from 55 to 75 kg/cm^2 . The changes in pipeline diameter at operating pressure have significantly increased wall thicknesses. Third, in order to reduce metal consumption, high strength pipe steel is coming into increasing use. In the last ten

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USSR

RAKHMANOV, A. S., STROITEL'STVO TRUBOPROVODOV No. 5, 1976

years, the strength of pipes used in pipelines has increased by 15%, and further increases from 60 to $70-80\text{ kg/mm}^2$ must be expected in the near future. Type 09G2S steel, 12-15 mm thick, can be welded without limitation as to welding mode, without heating at air temperatures down to -50°C , using broad range welding materials. Complications do not arise in the production of joints satisfying the requirements of the construction norms and rules, and practice has confirmed the high practicality of these joints. It is considered that these steels have good weldability. However, in order to weld the same steels in sheets thicker than 15 mm or dispersion-hardened steels of which larger diameter pipes are made, preliminary heating is required, as well as the use of special electrodes or a special layer beneath the seam to prevent cold spots at the root of the seam and other problems, that is these steels are of limited weldability. Type 17G2AF steel, now used for the manufacture of pipe at the Khartsyzsk Plant, has lower cold crack resistance than similar steels produced by other suppliers.

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USSR

RAKHMANOV, A. S., STROITEL'STVO TRUBOPROVODOV No. 5, 1976

An equally difficult problem is evaluation of the weldability of heat treated pipe with standard strength 72 kg/mm^2 . The problems defined by the peculiarities of the physical processes in seam formation and the behavior of various joints under load must be solved.

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USSR

UDC 539.411: 620.177.22: 666.1

PISARENKO, G. S., RODICHEV, YU. M., OKHRIMENKO, G. M., POLESHKO, A. P., STREKALOV, A. B., LIKHTENSHTLYN, V. N., IOTKOVSKAYA, L. M., and KLYUCHNIK, I. A. (Institute of Strength Problems, Academy of Sciences Ukrainian SSR, NIIavtosteklo)

COMPRESSIVE STRENGTH OF TECHNICAL SITALS

Kiev PROBLEMY PROCHNOSTI in Russian No 7, 76 pp 22-26
manuscript received 5 Mar 75

Abstract Five sitals (STL-10, A-1, A-3, A-6, and STM-1) were tested in axial compression under conditions of minimum influence of the contact stresses on the obtained strength curves. The compressive strength ranged from 209 kg/mm^2 (untempered A-3) to 248 kg/mm^2 (STL-10). Their specific strength is three to four times that of modern metallic structural materials. STL-10 showed insignificant sensitivity to specimen configuration. Ion exchange hardening showed a considerable positive effect on both compressive and creep strength, and is recommended as a means of increasing the load bearing capacity of sitals.
Tab 1 Ill 2 Bibl 14

USSR

UDC 539.376: 678

PERVUSHIN, YU. S., PAVLOV, V. P., and ZAYHULLIN, V. V. (Ufa Aviation Institute)

ON THE USE OF THE TEMPERATURE-TIME ANALOGY FOR COMPUTING CREEP STRAINS OF FIBERGLASS IN A NONSTATIONARY TEMPERATURE FIELD

Kiev PROBLEM PROCHESTI in Russian No 7, 76 pp 27-29 manuscript received 14 Jan 75

[Abstract] The temperature-time analogy is considered as a means of computing the creep strains of variously oriented fibreglasses with the TS-8/3-250 base fiber and FFE-70 binder under monaxial tension and nonstationary temperatures. Flat specimens 250 x 15 x 2 mm with cut-outs along the base were used. Strains were measured with an accuracy of ± 0.005 mm along a 105-mm base. The temperature drop did not exceed 2°C . Plotted experimental and theoretical curves show good agreement. Ill 4 Bibl 4

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USSR

UDC 539.4

GIGINYAK, F. F., BASHTA, V. V., LEBEDEV, A. A., and KHARCHENKO, V. K. (Institute of Strength Problems, Academy of Sciences Ukrainian SSR)

STRAIN AND RUPTURE PATTERNS OF A MOLYBDENUM ALLOY UNDER COMPLEX LOADING

Kiev PROBLEMY PROCHNOSTI in Russian No 7, 76 pp 35-38 manuscript received 17 Jul 75

[Abstract] Results are given of an experimental testing of thin-walled tubular specimens of a molybdenum alloy for the relative primary stresses

$$K \frac{\sigma_{\theta}}{\sigma_z} = 0; 1; 2$$

at room temperature. It is shown that the material retains satisfactory ductility over the entire range of primary stresses. The assumption of a generalized stress-strain curve for the given class of materials is confirmed. Experimental data obtained for both creep and rupture are in satisfactory agreement with the Mises criterion. Ill 6 Bibl 3

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USSR

UDC 539.4.016.669.28

DROZD, N. P., IVANSHCHENKO, R. K., MAKSIMOVICH, G. G., MIL'MAN, YU. V., SICHENKO, N. M., and TREFILOV, V. I. (Institute of Strength Problems, Kiev, and Physics and Mathematics Institute, Academy of Sciences Ukrainian SSR, L'vov)

INFLUENCE OF STRUCTURE ON THE HIGH-TEMPERATURE LONG-TIME STRENGTH OF MOLYBDENUM

Kiev PROBLEMY PROCHNOSTI in Russian No 7, 76 pp 39-43
manuscript received 8 Jan 75

[Abstract] A study is made of the influence of grain size and presence of porous dislocation structure on the long-time strength of low-alloyed TSM-6 molybdenum. It is shown that, with decreased grain size, particularly for porous structure, the long-time strength increases four to five times at test temperatures of 800-1,000°C for holding (soaking) periods of up to 500 hours.
Tab 1 Ill 4 Bibl 26

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USSR

UDC 620.178.311.6

KHIL'CHEVSKIY, V. V., and OVSYANNIKOV, YU. D.

INFLUENCE OF PLASTIC DEFORMATION BY TORSION ON THE DAMPING PROPERTIES OF 2Kh13 STEEL

Kiev PROBLEMY PROCHNOSTI in Russian No 7, 76 pp 54-57
manuscript received 5 Sep 75

[Abstract] It is shown that the energy diffusion for the plastic deformation of 2Kh13 steel, previously quenched at 1,050°C and annealed at 690°C, consists primarily of dislocation and magnetoelastic components, which depend on the method of deformation. The total energy diffusion for plastic deformation by torsion is greater than plastic deformation by tension. The main energy diffusion mechanism is microplastic deformation in both torsion and tension. Ill 4 Bib 7

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USSR

UDC 669.14.018

BOGDANOV, V. I., VLADIMIROV, S. A., GLADSHTEYN, L. I., and
GORITSKIY, V. I.

HEAT EMBRITTLEMENT OF LOW-ALLOYED STEEL 10KHSND DURING LONG
SOAKING PERIODS AT 340-450°C

Kiev PROBLEMY PROCHNOSTI in Russian No 7, 76 pp 65-73
manuscript received 27 Dec 74

[Abstract] A study is made of the heat embrittlement of
10KHSND steel (% 0.09C; 0.79Si; 0.63 Mn; 0.02 S; 0.02 P; 0.65
Cr; 0.50 Ni; 0.42 Cu) during long (up to 15,000 hours) periods
of soaking at 340, 400, and 450°C. The change in microstructure,
distribution of carbides, and particularly the fracture sur-
faces of impact specimens in relation to temperature and soaking
time, were investigated by illumination and replica methods of
electron microscopy. The mechanical properties of the steel
change very little, except that the resistance to brittle
fracture decreased greatly. Embrittlement increases with
increased soaking temperature and time. Tab 2 Ill 9 Bibl 11

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USSR

UDC 621.039.538:669.27

VORONIN, I. D., and KHNYKOV, YU. A.

STUDY OF THE SHIELDING PROPERTIES OF THE VNM-3-2 ALLOY

TRUDY N.-I. I KONSTRUKT. IN-TA ISPYTATEL'N. MASHIN, PRIBOROV, I SREDSTV
IZMERENIYA MASS [Transactions of the Scientific-Research and Design
Institute for Test Machines, Instruments, and Mass-Measuring Devices] in
Russian No 6, 1974 pp 178-180

[From REFERATIVNYY ZHURNAL, 50, YADERNYYE REAKTORY No 6, 1976 Abstract No
6.50.134 by A. A. Mel'nichenko]

[Text] Experimental results are presented on the attenuation of gamma rays
from Cs¹⁴⁷, Se⁷⁵, and Tm¹⁷⁰ sources which are protected with shields of the
heavy alloy VNM-3-2 (95% W, 3% Ni, and 2% Cu). Illustration 1; references 3.

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USSR

UDC 536.717.001.24 -

POPYRIN, L. S., STAROSTENKO, N. N., and STAROSTENKO, V. I.

N_2O_4 AS THE WORKING FLUID IN A SPACE POWER UNIT

Minsk IZVESTIYA AKADEMII NAUK BSSR, SER. FIZ.-ENERG. NAUK in Russian
No 4, 1975 pp 53-57

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 5, 1976 Abstract No 5G25]

[Text] A study is made of the thermodynamic cycle of a space power unit with N_2O_4 . Results are given on the studies of the effect of various factors on the efficiency of the cycle and the surface of the refrigerator radiator. For the same temperatures at the radiator outlet, the radiating surface is shown to be lower with N_2O_4 as a working fluid than for units using inter gases and dissociative phosphorus. Here the effective efficiency for the cycle approaches the efficiency of gas-liquid cycles with an ideal working fluid. Illustrations 4; References 9.

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USSR

GUDKOV, A., ZOTEYEV, V. S.

THE PROPAGATION OF A FATIGUE CRACK IN LOW-ALLOY, HIGH-STRENGTH STEEL

NOVYYE METODY ISPYT. METALLOV NO 3 in Russian, Moscow Metallurgiya Press
1976, pp 180-193

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No. 7V1464 by the authors]

[Text] Two rather simple and reliable methods of continuous tracking of the development of a crack under variable loading are recommended for broad practical use (method of sensors of sequential rupture and method of discontinuous loading). The rates of propagation of fatigue cracks in type 14KH2GMR steel are determined using these two methods. The fatigue crack propagation rates are determined using both cylindrical notched specimens and flat specimens with a central aperture. The experimental data produced in the testing in bending with rotation and in extension-compression are compared. 7 references.

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USSR

KORYAGIN, YU. D., SMIRNOV, M. A., GUREVICH, L. G., KAZACHKOV, B. M.,
POPOVTSEV, YU. A., IBRAGIMOV, KH. G.

MECHANICAL PROPERTIES OF THERMALLY STABLE TYPE 4KH8V2 STEEL SUBJECTED TO
HEAT AND MECHANICAL TREATMENT

SB. NAUCH. TR. CHELYABINSK. POLITEKHN. IN-T in Russian 1975, No. 163
pp 142-145

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No.
7V1512 by I. M. Gryaznov]

[Text] It is shown that the greatest strengthening of specimens of
4KH8V2 steel is achieved by rolling that at 900 C with 37% compression
with subsequent quenching in oil and tempering at 500 C. Strength is
increased by long-term (about 100 hr) heating to 530 C.

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USSR

MEKHEDA, V. A.

STUDY OF NONLINEAR DEFORMATIONS USING TENSORESISTORS

VOPR. PROCHNOSTI ELEMENTOV AVIATS. KONSTRUKTSIY VYP. 2 in Russian
Kuybyshev 1975, pp 92-96

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No.
7V1665 by the author]

[Text] Calculation formulas are produced as applicable to extension,
twisting and bending of specimens, relating the nonlinear deformation of
their surfaces to the thickness of the weakened surface layer. The
specimens are considered to consist of a linear deformable core and
an ideally plastic surface layer. The hypothesis of flat sections is
assumed correct. Experimental data are presented for specimens of
1KH18N8T steel and D16AT aluminum alloy. The influence of the rigidity
of tensoresistors in extension on measurement accuracy is analyzed.
6 references.

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USSR

UDC 621.378.325

BOLKOVA, N. V., ROZENMAN, L. S., FOMINA, V. N., TSIRUL'NIK, P. N.

OPTICAL CHARACTERISTICS OF NATURAL CRYSTALS OF ICELAND SPAR

Leningrad OPTIKO MEKHANICHESKAYA PROMYSHLENNOST' in Russian No. 6, 1976
pp 38-40 manuscript received 14 Aug 75

[Abstract] A study is made of the basic optical characteristics of natural crystals of Iceland spar from Siberian deposits. The spectral transmission of Iceland spar in the 220-3000 nm range are presented for ordinary and singular rays, the fluorescence spectra and fluorescence excitation spectra and numerical values of the index of refraction are presented. It is shown that natural Iceland spar is distinguished in its optical characteristics by great variety, which must be considered in selecting crystals for the manufacture of optical parts with assigned parameters.

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USSR

UDC 669.293:621.785.532

VASIL'YEVA, YE. V., VORONOVA, T. A., PROKOSHKIN, D. A., N. E. Bayman
Technical School, Moscow

INFLUENCE OF NITRIDING ON THE RESISTANCE OF DEFORMED NIOBIUM TO FURTHER
SMALL PLASTIC DEFORMATIONS

Moscow IZVESTIYA VUZOV MASHINOSTROYENIYE in Russian No. 6, 1976 pp 114-117
manuscript received 25 Jun 75

[Abstract] A study is made of the influence of deformation with subsequent nitriding on the resistivity, modulus of normal elasticity and resistance to small plastic deformations of niobium. It is shown that the main factor determining the increase in resistance to small plastic deformations under the conditions studied is diffusion saturation of the niobium with nitrogen. It is noted that the increase in the resistance of deformed niobium to slight plastic deformations resulting from nitriding is determined by the active interaction of the nitrogen atoms with defects in the crystalline structure and, furthermore, with dislocations created in the process of deformation.

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USSR

UDC 669.3.017.002

YEFIMOVA, V. P., MUKHIN, G. G., BLEKHEROV, V. M., GOLUBKOV, V. G.

THE NATURE OF DECAY OF A SUPERSATURATED SOLID SOLUTION OF ZIRCONIUM IN COPPER

Moscow IZVESTIYA VUZOV MASHINOSTROYENIYE in Russian No. 5, 1976 pp 132-135
manuscript received 23 Dec 75

[Abstract] Methods of metallographic and X-ray - structural analysis are used to study the decay of highly supersaturated solid solutions in powders of zirconium bronzes produced by centrifugal spraying. The powders contained 0.15, 0.4 and 1.9% zirconium by mass and during atomization were cooled at rates of up to 10^5 C/sec. It is shown that the softening of the solid solution upon aging in the 450-750 C temperature interval develops after 0.5-1.0 hr of holding. Preliminary cold deformation by 65% does not cause a great acceleration in the decay of the supersaturated solid solution. The expediency of using hot compacted powders for the production of strong nonporous bronzes is noted.

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USSR

UDC 621.893

MATVEYEVSKIY, R. M., IOFFE, G. A., LAZOVSKAYA, O. V., BUYANOVSKIY, I. A., and LEYKIN, A. I., Moscow

INFLUENCE OF THE STRUCTURE OF QUATERNARY BRONZE (COPPER-10% TIN-3% NICKEL-LEAD) AND CHANGE IN THE AMOUNT OF LEAD ON THE ANTIFRICTION CHARACTERISTICS AND WEAR RESISTANCE DURING THE FRICTION OF STEEL

Moscow MASHINOVEDENIYE in Russian No 4, Jul-Aug 76 pp 97-101 manuscript received 9 Apr 75 and 20 Jan 76

[Abstract] The authors of this article investigated and selected the structures and chemical composition of quaternary bronze which are the optimal ones for friction and wear. They found that the optimal chemical composition is that for bronze containing 4-6% lead which has the structure of a fully decayed solid solution. Figures 5; tables 2; references 8: 8 Russian.

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USSR

UDC 621.643.255.001.5

ZELIKIN, S. I., ZEMLYANSKIY, V. N., All Union Scientific Research Institute for Trunk Pipelines, BELKIN, V. A., MAMONOV, N. V., FEDOROV, V. P., PIVEN', L. S., ELINZON, M. P., All Union Research Institute for Construction Materials and Structures

PROPERTIES OF CERAMIC GRAVEL-BASED CONCRETE USED FOR THE PRODUCTION OF HYDRAULICALLY PRESSED AND VIBRATED PIPES

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No. 5, 1976 pp 21-23

[Abstract] Results are presented from studies of the physical-mechanical and deformation properties of ceramic gravel-based concretes compacted by vibration with subsequent pressing. The indicators are compared between vibrated and vibrated-pressed concretes. It is proven that vibrated and hydraulically pressed concrete pipe using ceramic gravel is suitable for transportation of liquid and gaseous products under pressures of up to 15 kg/cm^2 .

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USSR

UDC 621.187.11

DUBROVSKIY, I. YA., BATALINA, L. N., Moscow Power Engineering Institute

STUDY OF THE SOLUBILITY OF THE OXIDES OF COBALT AND IRON IN AN AQUEOUS COOLANT AT SUPERCRITICAL PRESSURE

Moscow TEPLA ENERGETIKA in Russian No. 6, Jun 76 pp 69-72

[Abstract] This investigation studies the solubility of the oxides of iron and cobalt in an aqueous supercritical pressure coolant. Cobalt oxide is present in the coolant if type KH18N10T steel is used as a structural material (for example in supercritical convective steam generators). A special autoclave was set up for the tests; three samples were taken during the course of each three-hour experiment and the concentrations of cobalt and iron determined photometrically. Analysis of the data produced shows that the solubility of magnetite is largely independent of pressure, temperature and density but significantly dependent on pH in the acid range. Increasing the pH to over 7 reduces the solubility of the corrosion products of iron and cobalt by almost 1.5 orders of magnitude; further increases in pH have little effect on solubility.

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USSR

UDC 620.172; 546. 34

SHCHERBAKOV, A. A., VLASOV, YU. N., and ZORYA, YE. I.

DETERMINING THE STABILITY OF CERTAIN STRUCTURAL MATERIALS IN
LIQUID ALUMINUM

Moscow IZVESTIYA VUZOV MASHINOSTROYENIYE in Russian No 7, 76
pp 92-94 manuscript received 15 Oct 75

[Abstract] Results are given on tests of the effect of liquid aluminum on the materials: steel IKh18N10T, St. 3, St. 45, 40Kh, 30KhGSNA, cast iron SCh-18-36. Cylindrical test specimens 5, 8, and 16 mm diameter and 10, 8, and 6 mm long, respectively, were used. The corrosion rate constants (in microns per second) were:

St. 3.	3.88
St. 45	2.96
SCh 18-16	1.13
40Kh	2.84
30KhGSNA	3.49
IKh18N10T	8.71.

Ill 1 Tab 3 Bibl 3

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USSR

UDC 669.715

SIDORIN, I. I., SILAYEVA, V. I., SOLOV'YEVA, T. V., and
KOLMAKOV, A. I.

THE HIGH-STRENGTH CAST ALLOY MVTU-5

Moscow IZVESTIYA VUZOV MASHINOSTROYENIYE in Russian No 7, 76
pp 110-113 manuscript received 16 Jul 75

[Abstract] Since the puncturing of petroleum and gas producing strata in very deep wells (down to 10 km) by the cumulative perforation method requires alloys able to withstand pressures of 150 MPa for six hours at 200 deg C, and the MVTU-2 and MVTU-3 alloys were satisfactory for use only down to a depth of seven km, the new MVTU-5 alloy was developed which, after hardening and aging, has the required pressure and temperature ratings to be used in the cumulative perforators in the deepest wells. The new alloy has the composition: silicon 10-11%; copper 4.8-5.2%; cadmium 0.1-0.2%; iron not over 0.5%; remainder aluminum. MVTU-5 has a tensile strength of 280 MPa in the cast condition, and up to 450 MPa after heat treatment, and can withstand hydrostatic pressures of 150 MPa and temperatures of 150-200 deg C.

Ill 1 Tab 2 Bibl 5

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USSR

UDC 532.13

PAVOCHNIK, A. I., SOLOVEY, R. L., Tashkent Polytechnical Institute

EXPERIMENTAL STUDY OF THE VISCOSITY OF FREONS AND THEIR MIXTURES IN THE LIQUID STATE AT ATMOSPHERIC PRESSURE

Moscow KHOLODIL'NAYA TEKHNIKA in Russian No. 7, pp 26-28

[Abstract] The authors experimentally studied the viscosity of a mixture of freons 142 and 11 and of freons 142 and 30. The capillary method was used in the study, since it is strictly based and comparatively simple. A formula is produced for the dynamic viscosity factor, and the Frenkel' formula is recommended as an interpolation formula for calculation of the viscosity of mixtures of freons.

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USSR

UDC 620.193:669.14.018.85

VARFOLOMEYEV, YU. I., PAVLOV, I. S.

STUDY OF HIGH TEMPERATURE CORROSION RESISTANCE OF NSM-2 STEEL IN THE COMBUSTION PRODUCTS OF HIGH-SULFUR FUEL OIL

Leningrad ENERGOMASHINOSTROYENIYE in Russian No. 6, 1976 pp 34-36

[Abstract] One 300 Mw unit of the Kirishskaya Regional Electric Power Plant was built with boiler membrane panels constructed of imported type NSM-2 (2.25 Cr, 1 Mo) steel in place of the type 12KH1MF and EI756 domestic steels ordinarily used for this purpose. The new steel has a higher chromium content than type 12KH1MF. A study was made of the high temperature corrosion resistance of the new steel when exposed to the products of combustion of sulfur-containing fuel oil. The corrosion rates of the steels are found to be almost identical up to 600 C, with type 12KH1MF superior as to corrosion resistance above 600 C. This probably results from the higher content of molybdenum in the new steel; the effects of molybdenum on high-temperature corrosion rates have been known for some time. It is concluded that type NSM-2 steel has the same high temperature corrosion resistance as low-carbon, low-alloy pearlite-type steels.

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ROMANIA

UDC 621.643

IONESCU-SISESTI, D., GEORGESCU, S., IONESCU, T. and DUMITRESCU, T.,
Institute for Research and Modernization in the Power Industry

ABRASION RESISTANCE OF GLASS FIBER REINFORCED POLYESTER PIPES. AGING,
MECHANICAL RESISTANCE, INFLAMMABILITY

Bucharest ENERGETICA in Romanian No 2, 1976 pp 55-59

[Abstract] Studies were conducted on polyester pipes reinforced with glass fiber with the aim of using them in the conveyance of ashes and slags which pose special abrasion problems (highly abrasive material), aging (outdoor pipes), mechanical resistance (pipes placed on posts), and inflammability (pipes located in fire-hazard areas). The results of the studies show that abrasion resistance is 1.7-1.8 lower than that of steel causing a pipe change rate which is 70-80% higher than that for metal pipes. Data are provided with regard to aging and mechanical resistance and a comparison is made with PVC pipes. As for inflammability, the water filled pipes maintain their tightness for 25 minutes in petroleum flames in a temperature of 500-700°C. Figures 3; tables 2; references 6.

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USSR

UDC 531.7.082.54:621.378.325

BONDARENKO, A. N., DROBOT, YU. B., KONSTANTINOV, V. A., KRIVOSHCHIEKOV, G. V., TROTSSENKO, V. P.

MEASUREMENT OF SMALL ACOUSTICAL OSCILLATIONS BY OPTICAL METHODS

Novosibirsk AVTOMETRIYA in Russian No. 3, 1976 pp 83-90 manuscript received 14 Mar 74

[Abstract] The possibilities are noted of a method based on the use of active interferometers (lasers) for measurement of small acoustical oscillations and results are presented from preliminary investigations. The measurements show that the sensitivity of the method is $1.2 \cdot 10^{-6} \mu\text{m}$. It should be noted that by selection of the optimal laser parameters achieving the strongest mode competition, the sensitivity of the method of measurement of oscillations can be improved by several orders of magnitude. Most promising from our standpoint for these purposes is the use of an He-Ne laser operating on the homogeneously expanded $3S_2-2P_4\text{Ne}$ transition ($\lambda = 3.39 \mu\text{m}$). Due to the high unsaturation factor of gain, this transition can be used to produce a small laser for measurement of oscillations with amplitudes of $10^{-8} \mu\text{m}$ and less. The metallic surface of the specimen studied can be used directly as the laser mirror.

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USSR

UDC 536.21.082.79:535.346.1

ZINO, I. Ye., TROPP, E. A., CHECHEL'NITSKIY, A. Z.

QUASI-UNIVARIATE THERMAL CONDUCTIVITY IN SOLID RODS

Unknown TRUDY METROLOGICHESKIKH INSTITUTOV SSSR. VNII METROLOGII in Russian No 187 (247), 1976 pp 82-88

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 32, 1976 Abstract No 5.32.1017]

[Text] A study is carried out on a steady-state problem of the theory of thermal conductivity for a right cylinder and a rod with an axis representing a plane curve. In this and in another instance it is believed that the ratio of the cross section diameter to rod length constitutes a small parameter $\epsilon \ll 1$. An asymptotic form is constructed for solving the problem when $\epsilon \rightarrow 0$ which includes a univariate solution and the boundary layers in the end zones. It is shown that the traditional univariate theory satisfies the case where $B = 0$ (ϵ^2) along the lateral surface. A variation of the basic algorithm for the case where $Bi = 0$ (ϵ) is indicated.

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USSR

UDC 533.932:533.915

PUSHKAREV, G. P., GUZEY, V. M., RISTO, V. A., GONCHARENKO, L. F.

EFFECT OF WALL TEMPERATURE ON THE AXIAL TEMPERATURE OF A CHANNEL ARC

Unknown TRUDY METROLOGICHESKIKH INSTITUTOV SSSR. VNII METROLOGII in Russian No 164 (224), 1974 pp 32-36

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 32, 1976 Abstract No 5.32.1038]

[Text] Temperature measurements were carried out for a central boundary washer; the results showed that the temperature of the channel wall corresponds to 800-100°K. At the given temperature the reflection coefficient of copper equals 0.95 and, consequently, the radiation falling on the channel wall is inversely reflected into a plasma volume. The obtained result is of practical significance, since it indicates the need to optimize cooling of the channel that stabilizes arc plasma, which had not been previously taken into account. Illustrations 3; references 6.

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USSR

UDC 629.12.01:65.012.122

BRESLAV, L. B., LIKHODAYEV, I. A.

USE OF LINEAR PROGRAMMING FOR OPTIMIZATION OF A PLAN FOR DIAGNOSIS OF SHIPBOARD PIPING

Moscow NADEZHNOT' I KONTROL' KACHESTVA in Russian No. 6, 1976 pp 49-54

[Abstract] The problem is stated as follows: maximize the mathematical expectation of finding the greatest number of defects with fixed limitations on time of testing of the piping systems on ships with instruments of various types. It is determined that the number of defective parts in seawater piping can be determined by testing 10 elements with welded branches, 160 flange joints and 40 elements with bends of over 90° using X-ray, thickness measuring and leak detecting instruments.

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USSR

UDC 621.181.262-52

POLONIK, V. S. and GOKHBERG, ZH. L.

ON THE DYNAMICS OF A DISCRETE MEASURING CIRCUIT, INCLUDING INERTIA AND TRANSPORT DELAY

Kiev DINAMIKA TEПLOVYKH PROTSESSOV [Dynamics of Heat Processes, Collection of Works] in Russian, Izd-vo Nauk Dumka, 1975 pp 31-34

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 3 1976 Abstract No 3S82 by G. A. Ishchenko]

[Text] The authors investigated the automatic control system for the process of combustion using an automatic chromatograph as the fuel-to-air ratio corrector. The size of the interval of discreteness of the automatic chromatograph is determined by the time of separation of the most important components of the flue gases and by the frequency characteristics of the basic perturbation tested by the system. For recovery of information which existed at the output in the intervals between the output discretes, in the system of measurement behind the impulse element is connected a fixing unit. The accuracy of operation of the system depends on the

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USSR

POLONIK, V. S. and GOKHBERG, ZH. L., DINAMIKA TEПLOVYKH PROTSESSOV, 1975 pp 31-34 [From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 3 1976 Abstract No 3S82]

order of the fixing unit and the allowable frequency spectrum of the signal. For checking the feasibility of adaptation of the interval of discreteness to the frequency they investigated the dynamic properties of the measuring circuit with a generalized fixing unit of the first order. The computations made on a Minsk-22 computer showed the infeasibility of adaptation of the interval of discreteness to the carrier frequency. For a random input signal the dynamic characteristics of the circuit with a fixing unit of the first order under identical conditions are worse than those of a circuit with a unit of zero order. Figures 3; references 6. [Odessa Polytechnic Institute; Tyumen' Industrial Institute].

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USSR

BARINOV, I. S., ORLOVA, Z. T.

DETERMINATION OF THE DENSITY OF MOLECULES OF NITROGEN IN A FREE MOLECULAR STREAM WITH A HIGH STAGNATION TEMPERATURE

UCH. ZAP. TSENTR. AERO-GIDRODINAM. IN-TA in Russian 1975, Vol. 6 No. 6 pp 119-123

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No. 7B308 from the resume]

[Text] Results are presented from an experimental determination of the density of a gas by a light-electronic method in a free-molecular stream of nitrogen with a stagnation temperature of 5000 K. A method is described for measurement and analysis made of the experimental error. An explanation is given of the significant reduction in the results of measurement of density at the core of the stream in comparison to the density of the residual gas. The results of the experiment are compared with the calculation results. 7 references.

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USSR

UDC 62.50

YEVGEN'YEV, V. S., Kiev Polytechnical Institute

SYNTHESIS OF SIMPLIFIED COMBINED MEASUREMENT SYSTEMS

Leningrad IZVESTIYA VUZOV PRIBOROSTROYENIYE in Russian No. 5, 1976 pp 76-80 manuscript received 15 Dec 75

[Abstract] Based on the criterion of the minimum dispersion of error of reproduction of the useful signal, the problem of simple processing of navigation information received from several measuring devices is analyzed. The author limits himself to the class of linear systems with infinite memory and analyzes the method of synthesis of a combined system of measurement of parameter $x(s)$ by simple (using but one correcting filter) processing of the continuous signals of two primary measuring devices.

USSR

UDC 621.371.542

LIPATOV, I. N., Leningrad Institute of Precision Mechanics and Optics

APPLICATION OF A DIGITAL FILTER FOR INCREASING THE ACCURACY OF DETERMINATION OF THE COORDINATES OF A FLIGHT VEHICLE

Leningrad IZVESTIYA VUZOV PRIBOROSTROYENIYE in Russian No. 5, 1976 pp 80-86 manuscript received 23 Dec 75

[Abstract] An estimate is made of the quality of smoothing in a navigation system with astrocorrection by means of a digital cosine filter for realizations of the calculated values of latitude and longitude. A study is made of the selection of the optimal value of the filter smoothing parameter. It is shown that the use of a digital cosine filter in a navigation system with astrocorrection allows the accuracy of determination of the geographic coordinates of a flight vehicle to be improved.

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USSR

UDC 588.33.083:523.73

CHEREMUKHIN, G. S., RACHITEL'NYY, A. I.

MEASUREMENT OF LOCAL RADIANT VELOCITIES OF THE SOLAR LIMB

Leningrad OPTIKO MEKHANICHESKAYA PROMYSHLENNOST' in Russian No. 6, 1976 pp 46-48 manuscript received 11 Aug 75

[Abstract] A study is made of the principle of operation of a doppler device for measurement of displacements of the fraunhofer lines in the solar spectrum. The criterion for selection of the working lines is examined. Means are shown for neutralization of certain types of interfering effects.

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USSR

UDC 53.08.+621.383.8

PINTUS, S. M., PRIMYSSKIY, V. A.

STROBOSCOPIC INTERPOLATION OF THE HARDWARE FUNCTION OF ELECTRONIC-OPTICAL CONVERTERS

Leningrad OPTIKO MEKHANICHESKAYA PROMYSHLENNOST' in Russian No. 5, 1976
pp 16-18 manuscript received 13 Mar 75

[Abstract] A study is made of the possibility of testing the resolving capacity of electronic-optical converters by stroboscopic interpolation of the hardware function. The problem is studied of determining the conditions of equivalency of hardware and visual methods of evaluation of the quality of the image of such a converter. The functional connections of the basic parameters of the measurement system are defined. The method of stroboscopic interpolation of the hardware function in objective measurement of the resolving capacity of the converter allows us to consider the necessary static and dynamic characteristics of the eye.

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USSR

UDC 539.106:543.843

CHERNOV, I. P., KOZYR', V. V., MATUSEVICH, V. A.

NONDESTRUCTIVE METHOD OF ANALYSIS OF THE CONTENT OF HYDROGEN IN THE THIN SURFACE LAYERS OF MATERIALS

Moscow ATOMNAYA ENERGIYA in Russian Vol. 41 No. 1, 1976 pp 51-53 manuscript received 4 Nov 75

[Abstract] A method is suggested for determining the content of hydrogen in the surface layers of specimens of arbitrary thickness. The method is based on recording of hydrogen nuclei ejected by accelerated ions from the surface of a specimen. In order to improve understanding of the method, the peculiarities of elastic scattering of heavy nuclei on light nuclei are analyzed. The sensitivity of the method when α particles with an energy of 12 MeV and carbon ions with an energy of 20 MeV are used for analysis is $4 \cdot 10^{12}$ and $1 \cdot 10^{12}$ nuclei/cm² respectively. The ion current is 0.1 μ A, analysis time 1 hour. The method described can also be used for determination of the content of heavy isotopes of hydrogen and helium.

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USSR

UDC 671.121.8

KUDRYASHEV, L. I., MIKHEYEV, V. I., and DAVYDOV, V. YA.

METHODS OF MATHEMATICAL STATISTICS FOR EVALUATING THE CALIBRATION ACCURACY OF A FLOWMETER ON AN INDUSTRIAL HYDRAULIC TEST STAND

Kazan' IZVESTIYA VUZOV AVIATIONNAYA TEKHNIKA in Russian
No 2, 76 pp 128-130 manuscript received 16 Dec 74

[Abstract] Since officially recommended flowmeters not always guarantee the accuracy required and thus must be calibrated individually, the authors, in order to obtain more precise calibration data and to judge the reliability of the obtained results, conducted a series of operations of a flowmeter on an industrial hydraulic test stand, which afforded them the possibility to process and estimate the accuracy of the calibration data by a method of mathematical statistics. Determinations were made of the errors in the pressure gradient at the diaphragm, the output of water, and of the coefficients for the dependence of water output on the pressure gradient, which were determined by the method of least squares. Bibl 3

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USSR

UDC 621.436 - 43

MOROZ, E. V., and KHANIN, N. S., All-Union Scientific-Research Institute of Optico-physical Measurements

HOLOGRAPHIC METHODS OF STUDYING HIGH SPEED PROCESSES IN DIESELS

Moscow IZVESTIYA VUZOV MASHINOSTROYENIYE in Russian No 7, 76 pp 95-98 manuscript received 24 Sep 75

[Abstract] The special aspects of the holographic investigation of high speed processes are described. Methods are described for recording the holograms of atomized jets and for processing the obtained information. Results are given of an experimental study of the dispersion of fuel by an injector selected as a model for processing holographic patterns and for the method of measurement. The pulsed holography method shows promise for precise measurement of the parameters of the fuel jets atomized by diesel injectors. The UIG-1M pulsed holograph installation and a ruby laser were used in the investigations. In all the experiments the holograms were recorded on Agfa-Gewehrt 10E75 film. Ill 3 Bibl 5

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USSR

UDC 662.613.5.001.5

KONDRATOVA, A. A., TLYUSTANGELOVA, M. V., KORSAKOVA, I. S., SOSNINA, N. P., PAVLOV, I. S.

DETERMINATION OF THE CONTENT OF CARBON PARTICLES IN THE EXHAUST GASES OF POWER PLANTS

Leningrad ENERGOMASHINOSTROYENIYE in Russian No. 6, 1976 pp 31-32

[Abstract] Results are presented from the use of a method developed by the All-Union Scientific Research Institute for Petroleum and Gas Processing and Synthetic Liquid Fuel Production for quantitative determination of carbon particles in the exhaust gases of power plants. This method does not require special equipment, allows rapid gas sampling and determination of carbon in small quantities of the gas. The method consists in trapping of the dispersed phase from the gases in absorption tubes with a filter material with subsequent determination of carbon in the sample using elementary analysis of organic compounds, based on the quantity of carbon dioxide formed upon combustion. The quantity of carbon in the sample was determined from the difference in carbon dioxide in the sample and in a control absorption tube, related to the volume of the gas sample drawn through the tube.

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USSR

ANTONOV, A. M., TRUNOV, A. N.

USE OF THE METHOD OF AVERAGING OPERATORS FOR SOLUTION OF THE PRIMARY EDGE PROBLEM OF GAS LUBRICATION

TR. NIKOLAYEV. KORABLESTROIT. IN-TA in Russian 1975, No. 105 pp 106-111

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No. 7B113 by the authors]

[Text] Based on a plan of continuous uneven injection and a method of averaging operators, the edge problem is solved for the flow of a viscous gas in shaped gaps between moving surfaces under conditions of forced injection. A general integral is produced for the pressure function, allowing an algorithm to be created for the calculation of basic characteristics of the gas layer, convenient both for analytic investigations and for numerical realization on a digital computer. 6 references.

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USSR

UDC 531.36

FRADLIN, B.N. and ROSHCHUPKIN, I.D., Kiev Polytechnic Institute; Krivograd Institute of Agricultural Machinery Design

THEORY OF STABILITY AND SMALL OSCILLATIONS WITH REGARD TO NONHOLONOMIC MECHANICAL SYSTEMS

Kiev PRIKLADNAYA MEKHANIKA in Russian Vol 12, No 4, Apr 76 pp 3-11 manuscript received 18 Apr 74

[Abstract] Nonholonomic systems include electrical machines, agricultural machines, guided aircraft, gyros, etc. The theory of their stability and small oscillations has not yet been completely and definitively developed. Under certain conditions, according to E.T. Whittacker (1937), such a system may be approximated by an appropriate holonomic one and the fundamental Routh-Voss equation of motion be solved in this way. Nonholonomic systems are substantially different, however, which is reflected in the characteristic determinant. The latter, as O. Bottema has shown (1949), is asymmetric with at least one zero root. The appearance of zero roots in the frequency equation reflects the existence of not one but many equilibrium states in the case of nonholonomic systems. This problem can be treated from the standpoint of the Lyapunov-Malkin stability theorem. References 69: 53 Russian, 1 Ukrainian, 15 Western

USSR

UDC 535.21

MITROPOL'SKIY, M. M., KHOTEYENKOV, V. A., KHODAKOV, G. S.

AVALANCHE BREAKDOWN AND THE PROBABILISTIC NATURE OF LASER FAILURE

Leningrad OPTIKO MEKHANICHESKAYA PROMYSHLENNOST' in Russian No. 6, 1976
pp 18-20 manuscript received 31 Jul 75

[Abstract] A study is made of the probabilistic aspects of the development of an electron avalanche arising under the influence of a powerful laser beam in a solid transparent dielectric. The distribution function of time and relative fluctuation of the number of electrons is found. The width of the probability function of failure is determined as a function of intensity. The relative dispersion of time of beginning of breakdown can also be determined. Its numerical value under identical conditions is $\pm 7\%$. These results are similar to the experimentally defined dispersion from an earlier work. The data produced also show that, in spite of the clearly probabilistic nature of the development of an avalanche, the slight width of the distribution causes the use of the threshold criterion for rupture of transparent dielectrics by laser radiation to be practically correct. The dependence of I_0 on pulse length

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USSR

MITROPOL'SKIY, M. M., KHOTEYENKOV, V. A., KHODAKOV, G. S., OPTIKO
MEKHANICHESKAYA PROMYSHLENNOST' No. 6, 1976 pp 18-20

agrees with experimental data from Nesterov, L. A. et al, ZHTF, Volume 40, No. 3, 1970, whereas I_0 (V) according to equation

$$I_0 = \frac{\ln N - \ln \ln(n_0 V + e)}{kt},$$

is significantly weaker than the actually observed value. This disagreement can be explained by various imperfections in the structure of the crystals and by their contamination, the frequency of appearance of which in the focal volume is proportional to its size and which were not considered in the theoretical statements developed here.

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USSR

UDC 535.315

SHEYNIS, N. V., PAVLOVA, L. V.

CHROMATISM OF A WEDGE SCANNER

Leningrad OPTIKO MEKHANICHESKAYA PROMYSHLENNOST' in Russian No. 5, 1976
pp 19-22 manuscript received 24 Dec 75

[Abstract] A study is made of the chromatism of a wedge variable deflection system consisting of two identical glued components which rotate about a common axis in opposite directions at equal angular velocities. Recommendations are presented for the most expedient method of achromatization of such a system over the full working range of angles of rotation of its components. Correction of chromatism with the maximum deflection does not assure achromatization at other angles of deflection. The most expedient achromatization is that in which chromatism takes on two extreme values in the working range of deflections, equal in absolute value and opposite in sign. The absolute value of these experimental quantities is the minimum amplitude of chromatism possible over the full range of deflection of the system for a given type of glass.

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USSR

UDC 681.2:537.7

KOVAL', S. T., KOLOBRODOV, V. G.

STATISTICAL CHARACTERISTICS OF THE REFLECTION FACTOR OF CERTAIN MIRROR SURFACES

Leningrad OPTIKO MEKHANICHESKAYA PROMYSHLENNOST' in Russian No. 6, 1976
pp 6-10 manuscript received 22 Mar 75

[Abstract] A study is made of the statistical characteristics of fluctuations in the reflection factor of mirror surfaces. The Wiener spectrum is found by spectral processing of a random photosensor signal, the autocorrelation function is determined by an optical noncoherent correlator. The experimental curves produced are approximated by the corresponding functions. The theoretical and experimentally tested statistical characteristics of fluctuation of reflection of the surface of a ferrite rotor analyzed in the article indicate that the Wiener spectrum and autocorrelation function are described with sufficient accuracy by the functions $W_{\rho}(f_r) = 2\pi\sigma_{\rho}^2 r_{\rho}^2 \exp(-4\pi^2 r_{\rho}^2 f_r^2)$ and

$K_{\rho}(\ell) = \sigma_{\rho}^2 \exp(-\frac{\ell}{r_{\rho}})$, while the mean radius of microdefects of the surface

of ferrite rotors of contactless gyroscopes is 12.5 μm .

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USSR

UDC 621.391.883.3:538.8

DEMIDOV, YE. F., SHARKOVA, E. V.

INFLUENCE OF LENS QUALITY ON SIGNAL/NOISE RATIO IN SCANNING OPTICAL-ELECTRONIC SYSTEMS

Leningrad OPTIKO MEKHANICHESKAYA PROMYSHLENNOST' in Russian No. 6, 1976
pp 3-6 manuscript received 1 Aug 75

[Abstract] Analytic expressions are found for determination of the signal/noise ratio as a function of the quality of a lens (ratio of diameters of circle of confusion of the lens and of the photoreceptor) in the direction of scanning. The results produced are analyzed and calculations performed as necessary to estimate the influence of this relationship on the signal/noise ratio. The results of the analysis allow the calculation method presented in earlier works to be refined, defining the threshold sensitivity of scanning optical-electronic systems with arbitrary ratio of dimensions of the circle of confusion of the lens and the photoreceptor. Depending on the quality of the lens in the scanning direction for $d_o \leq a_r$, the signal/noise ratio may be decreased from 25% (for the optimal system) to 35% (for the ideal filter).

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USSR

UDC 621.391.172:772.99

KUKAROV, G. V., PROTASEVICH, V. I., PRYAKHIN, YU. A.

A POSSIBLE METHOD OF REALIZATION OF AN "INVARIANT" HOLOGRAPHIC FILTER

Novosibirsk AVTOMETRIYA in Russian No. 3, 1976 pp 104-105 manuscript
received 15 Sep 75

[Abstract] Modern optical systems process information using optically matched filters producing a Fourier hologram of an object, which can be produced by various methods. However, such systems are quite sensitive to relative rotation of the filter and image at the input to the system, increasing the requirements for accuracy of the devices we used to move the filters and increasing the processing time of images due to the need for rotation. In this report for objects in the form of a set of points (or near point sources) with predetermined spatial distribution, in order to achieve "invariance" of the optical correlation systems regardless of relative angle of rotation of filter and image, it is suggested that a supplementary object be produced in the form of arcs with a common arbitrary center. The arcs of the supplementary image are made as wide as the diameter of the points of the initial object with an angular size determined

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USSR

KUKAROV, G. V., PROTASEVICH, V. I., PRYAKHIN, YU. A., AVTOMETRIYA No. 3
1976 pp 104-105

by the required limits of invariance, the geometric locus of the midpoints of the arcs of the supplementary images corresponding to the position of the point sources of the initial object. The hologram is then prepared and used in the initial object as an invariant filter. Since the filter made according to the method suggested is not matched in the precise sense of the word, its invariance is achieved by a significant reduction in the maximum correlation function, which causes a deterioration in the selectivity of the system.

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Stress Analysis & Stability Studies

USSR

ZEVIN, A. A.

OPTIMAL CONTROL OF A VIBRATION-IMPACT SYSTEM WITH NONLINEAR ELASTIC COUPLING CHARACTERISTICS

NELINEYN. MEKHANIKA. VYP. 1 in Russian, Dnepropetrovsk 1975, pp 129-137

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No. 7A163 by the author]

[Text] A study is made of a single-mass system with a nonmoving limiter and an arbitrary single-valued elastic coupling characteristic. A piecewise-continuous, modulus-limited control is sought for which the energy transmitted to the limiter per unit time is maximal when a mode is realized in the system with one collision per period. The solution is produced using a phase plane. It is shown that the optimal control is a relay control which switches twice per period. In the general case, the problem is reduced to seeking out the maximum of a function of one variable. The influence of characteristics of elastic coupling on the effectiveness of the system is studied; it is established that as the "rigidity" of the

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USSR

ZEVIN, A. A., NELINEYN. MEKHANIKA. VYP. 1, 1975 pp 129-137

characteristic increases, the effectiveness increases. Numerical calculations are performed for linear and cubic characteristics. The synthesis of a self-oscillating system realizing the optimal mode found is also analyzed. 8 references.

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USSR

UDC 539.621:534.141

DORFMAN, G. G., Leningrad

EXPERIMENTAL INVESTIGATION OF THE BOUNDARY FORCE OF FRICTION OF REST AND ITS INFLUENCE ON FRICTIONAL SELF-OSCILLATIONS

Moscow MASHINOVEDENIYE in Russian No 4, Jul-Aug 76 pp 107-112 manuscript received 25 Apr 75 and 21 Feb 76

[Abstract] As a result of a statistical processing of experiments conducted under near-production conditions, the author obtains the numerical characteristics of the law of distribution of boundary forces of friction of rest that are important for practical computations. With a high degree of confidence he confirms the existence of dependences of the boundary force friction of rest on the rate of loading and on the time of fixed contact. He shows that under these conditions the influence of these dependences may lead to a significant decrease in the maximum values of the dynamic force of friction in comparison with the statistical characteristics. Analysis of the dynamic characteristics of the

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USSR

DORFMAN, G. G., MASHINOVEDENIYE, No 4, Jul-Aug 76 pp 107-112

friction confirmed that the delay forces of friction from the rate of glide exert a significant influence on the formation of the force of friction during self-oscillations. The role of these factors examined here is reduced to decreasing the flow of energy to the self-oscillating system. Figures 5; tables 2; references 6: 6 Russian.

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USSR

UDC 621.643+411.4

BOLOKHONTSEV, M. N., NIKOLAYEV, G. A., KISELEV, A. I., KISELEV, I. I.,
E. N. Bauman Higher Technical School, Moscow

INFLUENCE OF DEFECTS ON THE STRENGTH OF SOLDER JOINTS

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No. 7, 1976 pp 15-17

[Abstract] To allow a more detailed study of the process of soldering, the Welding Laboratory of the Bauman Technical School undertook a comprehensive analysis of the strength of butt and overlap solder joints under static and dynamic loading conditions. It was found that defects which reach the surface of the joints are most dangerous for both types of joints. Under variable loading, the influence of internal incomplete soldering of up to 40% of the area on the durability of overlap joints is insignificant. The endurance limit of joints with chamfers was found to be 25-30% greater than that of joints without chamfers. The endurance of joints without chamfers can be increased by increasing the length of the overlap.

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USSR

UDC 624.071.2.042.8:534.014.2

BUBNOVICH, E. V., Central Scientific Research Institute for Construction
Structures, Moscow

STUDY OF RESONANCES DURING FORCED INTERRELATED OSCILLATIONS OF A FLEXIBLE
LINE

Moscow STROITEL'NAYA MEKHANIKA I RASCHET SOORUZHENIY in Russian No. 4, 1976
pp 44-47

[Abstract] A study is made of the forced oscillations of a flexible line with nonmoving end supports, both at the same level. It is considered that the line can perform transverse oscillations in its own plane and pendulum oscillations relative to the chord connecting the supports, at the same time. Parametric resonance is studied in connection with the problems of dynamic stability of structures, while resonance of the second type and combination resonances have also been studied. In this article, primary attention is given to the study of oscillations of the line with simultaneous internal and external resonance of first and second order. Amplitude-frequency dependences are presented for stable oscillation modes.

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USSR

UDC 629.78.015:533.6.015.4

KAZAKEVICH, M.I., and STRIZHAK, V.I.

AEROELASTIC OSCILLATIONS OF PRISMATIC BODIES WITH SQUARE CROSS-SECTIONS

Dnepropetrovsk Nelineynaya Mekhanika [Nonlinear Mechanics, Collection of Works] in Russian, No 1, 1975 pp 42-54

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No 7 1976 Abstract No 7.41.93 (resume)]

[Text] The authors discuss the aeroelastic oscillations of a galloping-type cylinder with a square cross-section that is situated in a uniform flow, at some angle of attack with respect to the direction of the flow. They determine the aerodynamic forces acting on the oscillating cylinder, and derive the nonlinear differential equation for the cylinder's aeroelastic oscillations. They analyze the possible modes of aeroelastic self-oscillation (of the galloping-motion type). The authors find the conditions for the existence of stable limiting cycles and establish the critical rate of appearance of self-oscillations. They then generalize their results for the case of a flow moving past different bodies with sharp edges. Figures 4; references 7.
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USSR

UDC 629.78.015.4

MARTYNYUK, P.A.

ON THE DYNAMIC LOADING OF A HALF-PLANE WITH A CRACK UNDER ANTIPLANE DEFORMATION CONDITIONS

Novosibirsk Dinamika Sploshnoy Sredy [Dynamics of a Continuous Medium, Collection of Works] in Russian, No 22, 1975 pp 216-230

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No 7 1976 Abstract No 7.41.166 (resume)]

[Text] The author discusses the problem of the sudden loading of a crack located parallel to the boundary of a half-plane at a distance h from the boundary. He investigates two variants of the boundary conditions. The half-plane's boundary is free of stresses and rigidly fastened. Using the methods and properties of integral Laplace and Fourier transforms, the solution of the problem reduces to finding the solution of an integral Fredholm equation of the second type. In connection with this, the coefficient of stress intensity for a feature on the order of $\Delta x^{-\frac{1}{2}}$ ($\Delta x \ll 1$) at the head of the crack is simply expressed in terms of the Fredholm equation's solution.
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USSR

MARTYNYUK, P.A., DINAMIKA SPLOSNOY SREDY, No 22, 1975 pp 216-230

The author used the Wiener-Hopf method to obtain an exact solution of the limiting problem, when $l \gg h$, and used numerical methods to construct the dependences of the coefficient of stress intensity on time for $l/h = 1$ and $l/h = 2$, as well as the dependence of the same coefficient on the ratio l/h when $t \rightarrow \infty$. Figures 2.

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USSR

UDC 629.78.015.4

BORODACHEV, N.M., ZHDANOVICH, M.P., and SAVCHENKO, N.I.

AN ANALYTICAL DESCRIPTION OF THE PROCESS OF PROPAGATION OF A FATIGUE MACROCRACK UNDER A STATIC LOAD

Kiev PROCHNOST', NADEZHNOST' I DOLGOVECHNOST' AVIATIONNYKH KONSTRUKTSIY [Strength, Reliability and Durability of Aviation Designs, Collection of Works] in Russian, No 1, 1975 pp 36-39

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No 7 1976 Abstract No 7.41.168 by T.A.Ye]

[Text] The authors propose a formula for the analytical description of the propagation process for a fatigue macrocrack in flat test pieces under a static load (a constant-sign tension cycle). They compare their results with experimental data obtained during tests of flat test pieces made of D16ATV material. Figures 2; references 4.

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USSR

UDC 532.282

FOMIN, M. V.

ENERGY DISSIPATION IN PRESSED-WIRE ELASTIC ELEMENTS

Moscow IZVESTIYA VUZOV MASHINOSTROYENIYE in Russian No 7, 76
pp 15-18 manuscript received 20 Dec 75

[Abstract] To describe the hysteresis loop configurations of elastic elements for an arbitrary, asymmetrical load cycle, the author derives equations that can be used to plot the field of hysteresis loops both for the different elements and for combinations of them over the entire range of permissible loads. The relationships established can be used for dynamic calculations of systems containing elastic elements made of pressed wire and operating under cyclic compression. The damping capacity of the elastic element is characterized by two constants, k and λ , which can be determined experimentally ($k = 0.2-0.4$; $\lambda = 70-100$). The rigidity and damping capacities of pressed-wire elastic damping elements is practically independent of the rate of deformation within the frequency range of 0-250 Hz. Ill 1 Bibl 4

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USSR

UDC 539.3: 629: 7.02

KULIKOV, YU. K. and KHOMYAKOV, A. M.

BEARING CAPACITY OF THIN SHELLS LOADED BY A LOCAL NORMAL FORCE

Kazan' IZVESTIYA VUZOV AVIATSIONNAYA TEKHNIKA in Russian
No 2, 76 pp 131-134 manuscript received 26 Nov 74

[Abstract] Plastic failure mechanisms are considered for two identically loaded shells, one cylindrical and one spherical, that are subjected to an internal pressure and a local force perpendicular to the surfaces of the shells at the centers. On the basis of the kinematic method of the theory of limited equilibrium (ordinarily used for analyzing plasticity mechanisms), the authors obtain analytical relationships that connect the limit values of the local normal concentrated forces with the geometrical parameters of the shells and magnitude of the internal pressures. These relationships may be used as formulas for calculating the bearing capacities of shell structures that have a corresponding design scheme, i.e., a corresponding mechanism of plastic failure. Ill 5 Bibl 2

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USSR

UDC 539.41:621.791.053

KRYANIN, I. R., VASIL'CHENKO, G. S., KOSHELEV, P. F., SINADSKIY, S. YE., LYGLAYEV, A. V. and RYBOVALOV, YU. P., Moscow

INVESTIGATION OF THE STRENGTH OF NON-HEAT TREATED WELD JOINTS OF THICK-WALL SHEET STRUCTURES

Moscow MASHINOVEDENIYE in Russian No 4, Jul-Aug 76 pp 81-88 manuscript received 23 Nov 75

[Abstract] The authors cite the results of tests on steels 14GNMA and 22K and their weld joints for the purpose of selecting an optimal welding mode for 70-mm thick sheets. According to the tests for extracentred tension, bending and for tension of slabs of normal thickness they obtained the strength and deformation characteristics of resistance to fracture using the criteria of fracture mechanics in elastic formulation just as under conditions of ordinary creep. They examine the methods of analyzing strength of the structure with defects and estimated the dimensions of the allowable defects relative to the spiral chamber of the hydroturbine. Figures 6; tables 3; references 6: 4 Russian, 2 Western.

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USSR

UDC 534.015

KOZHEVNIKOV, S. N. and NURIBEKOV, I. A-G., Kiev

QUALITATIVE ANALYSIS ON THE PHASE PLANE OF DYNAMIC PROCESSES OF TWO- AND THREE-MASS TORSION SYSTEMS

Moscow MASHINOVEDENIYE in Russian No 4, Jul-Aug 76 pp 10-17 manuscript received 17 Mar 75 and 16 Feb 76

[Abstract] The authors examine the possibilities of using a phase plane for analyzing dynamic phenomena in mechanical systems acted on by external forces. The phase patterns in these cases are produced by the use of analog computers. They investigated the transitional processes in two- and three-mass torsion systems acted on by the external moment whose character in the transition phase varied differently. They found the criteria which ensure favorable recovery of the stationary mode in the system for which the dynamic overloads are fully removed, and the duration of the non-steady-state motion is found to be minimal. The obtained results are applicable for linear systems and with a large volume of masses, and the suggested method permits seeking the optimal modes of loading in nonlinear systems and in systems with varying parameters. Figures 5; table 1; references 3: 2 Russian, 1 Western.

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USSR

UDC 620.178.3

CHATYNYAN, R. M.

KINETICS OF STATISTICAL DISTRIBUTION OF DISLOCATIONS

Moscow IZVESTIYA VUZOV MASHINOSTROYENIYE in Russian No. 5, 1976 pp 14-18
manuscript received 24 Nov 75

[Abstract] Equations are produced for the kinetic statistical distribution of dislocations in the process of fatigue of metals, allowing equations for microplastic deformations and internal friction, equations for the fatigue curve and linear summation of damage to be produced, and also the area of applicability of the conditions of linear summation of damage and the criteria for existence of a physical fatigue limit to be determined.

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USSR

UDC 539.3

ANDREYEV, L. V., OBODAN, N. I., LEBEDEV, A. G., Dnepropetrovsk State University

ANALYSIS OF THE BEHAVIOR OF GEOMETRICALLY NONLINEAR CYLINDRICAL SHELLS

Moscow IZVESTIYA VUZOV MASHINOSTROYENIYE in Russian No. 5, 1976 pp 5-9
manuscript received 22 Dec 75

[Abstract] A study is made of the geometrically nonlinear problem of deformation of a cylindrical shell with nonaxisymmetrical external pressure. The initial problem is reduced to a one-dimensional edge problem for a system of nonlinear differential equations, the solution of which is constructed by the method of conversion to a Cauchy problem. The theory of branching solutions of nonlinear edge problems is used to investigate the behavior of the solution. A numerical investigation of the deformation of a cylindrical envelope is undertaken with stepwise change in the external pressure around the circumference. The basic types of deformation and peculiarities of behavior are differentiated: monotonic deformation, snapping, general and local bulging.

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USSR

UDC 539.375

KAMINSKIY, A. A.

STUDY OF THE DEVELOPMENT OF CRACKS IN A VISCOELASTIC ANISOTROPIC PLATE

Kiev PRIKLADNAYA MEKhanika in Russian No. 6, 1976 pp 76-84 manuscript received 26 May 75

[Abstract] Following an approach developed in an earlier work, the kinetics of the growth of a crack in a viscoelastic anisotropic plate are studied when the deformation of the plate is described by means of E^* operators, and the results produced are applied to the study of the durability of composite materials.

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USSR

UDC 539.3

RUSHCHITSKIY, YA. YA., RUSHCHITSKAYA, S. O., Institute of Mechanics, Acad. Sci. UkrSSR

SPHERICAL WAVES IN MIXTURE THEORY

Kiev PRIKLADNAYA MEKhanika in Russian No. 6, 1976 pp 63-69 manuscript received 25 Dec 74

[Abstract] A study is made of the problem of traveling waves in an infinite medium with a spherical cavity, to the surface of which pressure is applied. It is considered that the material of the medium is a mixture of two elastic materials, and the behavior of the medium is described by a system of equations from the theory of mixtures. The oscillations of the different components with the same spatial coordinate occur in opposite phases with approximately the same amplitude. At low frequencies, less than 10^3 Hz, the exponential wave has practically no influence on the oscillations of the particles, since its amplitude is very slight. For a fixed low frequency, the movement of the particles located far from the cavity is defined by the parameters of the traveling wave.

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USSR

UDC 678:621.3

VANIN, G. A., Institute of Mechanics, Acad. Sci. UkSSR

THERMOELECTRIC PHENOMENA IN COMPOSITE MEDIA

Kiev PRIKLADNAYA MEKHANIKA in Russian No. 6, 1976 pp 41-47 manuscript received 16 Jul 75

[Abstract] The principles of the theory of thermoelectric phenomena in multicomponent (hybrid) reinforced media are suggested in the phenomenological approximation; using these principles, average equations for transfer and the relationship of the internal fields and integral (adjusted) thermoelectric parameters of composite structures are established with the characteristics of the components, their volumetric content and the configuration of the structure of the material. The formulas produced provide a means for investigation of additional thermal stresses in reinforced semiconductor media resulting from the flow of current; diagrams for reinforcement of materials and properties of the components while evaluating the load-bearing capacity of the structural elements of the composites under the simultaneous influence of fields of various physical pipes.

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USSR

UDC 621.362:621.3.012.7

SIMONOV, V. A. and FILIPPOV, Moscow

ON THE INTER-RELATIONSHIP OF ENERGY CHARACTERISTICS AND THERMO-ELASTIC STRESSES IN A COOLING THERMOCOUPLE

Moscow IZVESTIYA AN SSSR, ENERGETIKA I TRANSPORT in Russian No 3, May-Jun 76 pp 126-130 manuscript received 3 Apr 75

[Abstract] The authors demonstrate that the presence in real cooling thermocouple of temperature gradients in hundreds of degrees per centimeter leads to the onset in the semiconductor material of a complex thermoelastic stressed state. They derive equations and dependences which permit computing the field of the thermoelastic stresses. The analytical results of the research were confirmed experimentally. They demonstrate the inter-relationship between the stressed state found for the material and the Peltier coefficient. Figures 4; references 6: 6 Russian.

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USSR

CHURAKOV, A. A.

DETERMINATION OF EQUIVALENT LOADING MODES

VOPR. PROCHNOSTI ZLEMENTOV AVIATS. KONSTRUKTSIY VYP. 2 in Russian
Kuybyshev 1975, pp 112-116

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No. 7V1509 by the author]

[Text] A method is presented for determination of the harmonic modes of loading equivalent in durability to random loads acting on a structure in use. The method is illustrated on the example of a flat specimen with a concentrator in the form of an aperture, made of 1KH18N10T steel. The durability, found through equivalent loads, agrees satisfactorily with its experimental value with random loading.

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USSR

TIMSHIN, V. T., KHAZANOV, KH. S.

CALCULATION-EXPERIMENTAL METHOD OF DURABILITY WITH RANDOM LOADS

VOPR. PROCHNOSTI ELEMENTOV AVIATS. KONSTRUKTSIY VYP. 2 in Russian,
Kuybyshev 1975, pp 97-103

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No. 7V1448 by the authors]

[Text] A method is discussed for calculation of the durability of elements with random loads for pure bending, twisting and their combined action. The initial curves used for determination of durability are the base curves of the fatigue produced by harmonic loading in pure bending and twisting, as well as the realization of the random process at various levels of loading. Results of calculations are compared with experimental data. 6 references.

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USSR

VASIL'YEV, L. M., KEREKILITSA, L. G., KOZHEMYAKA, I. I.

STUDY OF THE DISTRIBUTION OF STRESSES IN THE PRECUTTING ZONE BY THE METHOD OF PHOTOELASTICITY

MEKH. I RAZRUSHENIYE GORN. POROD. VYP. 3 in Russian, Kiev, Nauk. Dumka Press 1975, pp 201-205

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No. 7V966 by V. S. Nikiforovskiy]

[Text] A discussion is presented of certain peculiarities of the stress field in a plate of an optically active material, arising as a result of the action of a model of a cutter with an angle of 30° , 90° and 120° . The possibility is noted of rupture of the material as a result of separation and the action of the maximum tangential stresses, with continuous transition from the former to the latter type of rupture with a decrease in cutter angle from 120 to 30° .

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USSR

ANDRIANOV, I. V., MANEVICH, L. I.

TRANSMISSION OF FORCES THROUGH AN ELASTIC ELEMENT TO AN ORTHOTROPIC STRIP REINFORCED BY STRINGERS

TR. IX VSES. KONF. PO TEORII OBOLOCHEK I PLASTIN, 1973 in Russian, Leningrad Sudostroyeniye Press 1975, pp 244-247

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No. 7V241 by V. M. Tolkachev]

[Text] The planar problem of the theory of elasticity is solved for a strip ($0 \leq x \leq H$, $-\infty < y < \infty$), reinforced along the x axis with a regular force-accepting set of ribs attached along the lines. Along the $x = 0, H$ sides, the strip is also reinforced with ribs operating in bending and extension-compression. Along the $x = 0$ or $x = H$ side, a normal load, periodic along y , is applied. In the first stage of the solution, the ribs are "spread out" and the problem is solved for an orthotropic strip by an asymptotic method. A solution in addition to the rapidly changing solution along y is determined by maintaining only the high derivatives with respect to y , the discrepancies along the boundaries $x = 0, H$ are compensated by a boundary layer-type solution.

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USSR

TIL'SH, A. L.

STABILITY OF CANTILEVER CYLINDRICAL SHELVES WITH NOTCHES WHEN BENT BY TRANSVERSE FORCES WITH EXTERNAL PRESSURE AND AXIAL COMPRESSION

PROCHNOST' I ZHESTKOST' TONKOSTEN. KONSTRUKTSIY in Russian, Leningrad 1975, pp 142-146

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No. 7V413 by V. V. Kabanov]

[Text] Results are presented from stability testing of cantilever mounted circular cylindrical envelopes with a circular notch located at the middle of the length of the envelope on its lower surface. The edge of the envelope is attached to a rigid ring frame support, to which a transverse force and axial forces evenly distributed around the circumference are applied. The envelopes are made of aluminum foil and have the dimensions $L/R = 3.5$, $R/h = 850$, where L , R , h are the length, radius and thickness of the envelopes. Loss of stability occurred in two stages. First there was local loss of stability at the notch, then

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USSR

TIL'SH, A. L., PROCHNOST' I ZHESTKOST' TONKOSTEN. KONSTRUKTSIY 1975, pp 142-146

general loss of stability on the sides of the envelope. Processing of the experiment by the method of least squares and application of the theorem of Papkovich are used to recommend the following curve of interaction of the loads:

$$\left(\frac{P}{P_*}\right)^{1.112} + \frac{Q}{Q_*} = 1$$

where P , Q are the axial and transverse forces, P_* , Q_* are their critical values for separate loading. Results are also presented from testing of envelopes with external pressure and transverse bending. In this case, the following curve is recommended:

$$\left(\frac{Q}{Q_*}\right)^{2.55} + \frac{q}{q_*} = 1$$

Approximate formulas are presented for P_* , Q_* and q_* .

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USSR

UDC 621.643.001.2

SPIRIDONOV, V. V., SHVARTS, L. YE. and PEREL'MITER, A. D.

OPERATION OF DEVICES USED TO PREVENT PIPELINE VIBRATIONS

Moscow STROITEL'STVO TRUBOPROVODOV in Russian, No 1, Jan 76 pp 22-25

[Abstract] The authors of this article investigate vibrations of a surface pipeline with devices installed on it to prevent vibrations. They demonstrate that the utilization of such devices permits the spans of the pipeline to be significantly increased and will simultaneously ensure their aerodynamic stability. On the basis of analyzing the parameters of the oscillations they come to the conclusion that it is possible to utilize them in determining the frequencies of the vibrations of the computed dependences for single-span beam systems. Figures 4.

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USSR

UDC 593.4

KOLOBANOV, V. YU. (Riga)

STRESS DISTRIBUTIONS IN A TURBINE DISK AT VARIOUS NONSTATIONARY LOAD RATES

Kiev PROBLEMY PROCHNOSTI in Russian No 7, 76 pp 94-97 manuscript received 13 Feb 75

[Abstract] The results of a theoretical calculation of a non-uniformly heated rotating flat turbine disk at various load rates show that the distribution of the loads in the disk depends on the rate of the previous loading. The calculations show for different load rates a dependence of stress distribution in the turbine disk on the rate of nonstationary loading; it is assumed that this is connected with a difference in the non-elastic behavior during the previous loading.
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Turbine & Engine Design

USSR

UDC 62-135:533.6.011

LEONKOV, A. M., BALABANOVICH, V. K.

STUDY OF LOSSES OF NO-LOAD ROTATION IN A TURBINE SYSTEM

NAUCH I PRIKL. PROBL. ENERGETIKI in Russian No. 2 Minsk, Vysheysk
Shkola Press 1975, pp 3-6

[Translated from REFERATIVNYY ZHURNAL 49. TURBOSTROYENIYE No. 5, 1976
Abstract No. 5.49.26 by L. P. A.]

[Text] A study was made of energy losses and the flow structure in a stage with blade slope as applicable to the last stages of heating steam turbines, operating at low volumetric flow rates. For this purpose, the Turbines Laboratory of the Electric Power Plant Department of the Vyelorusian Polytechnical Institute has developed and created an experimental installation consisting of a single-stage air turbine, connected to a reversible dc machine. The power consumed in this installation is defined as the difference between the power consumed by the motor and the power of losses in the bearings, to friction of the disc of the stage, as well as electromechanical losses. The latter are determined using a special

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USSR

LEONKOV, A. M., BALABANOVICH, V. K., NAUCH. I PRIKL. PROBL. ENERGETIKI
No. 2, 1975 pp 3-6

calibration cycle using a bladeless drive wheel. A study is made of the influence of nozzle blade stall on the losses in no-load rotation of the turbine stage. The stage had blades twisted according to the rule $rc = \text{Const}$; the ratio of blade diameter to height was 4.5. The range of w change of nozzle blade slope was 25° , reading from the radial direction. The results of testing are presented graphically. 2 figures; 4 references.

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USSR

UDC 621.224-531

DRAGANOV, B. M., IVANOV, P. S.

AMPLITUDE-PHASE CHARACTERISTICS OF A SYSTEM FOR AUTOMATIC REGULATION OF THE FREQUENCY OF ROTATION OF A HYDRAULIC TURBINE WITH INPUT OF A SIGNAL BASED ON THE VALUE OF THE SECOND DERIVATIVE

AMPLITUDNO-FAZOVYYE KHARAKTERISTIKI NA SISTEMATA ZA AVTOMATICHNO REGULIRANYE NA SKOROSTTA NA VODNI TURBINI PRI V'VEZHDANE NA SIGNAL OT VTORATA Y PROIZVODNA VMEI in Russian Lenin Press 1975, Vol. 34, No. 7 pp 67-72 (Bulgarian)

[Translated from REFERATIVNYY ZHURNAL 49. TURBOSTROYENIYE No. 6, 1976 Abstract No. 6.49.161 by S. A. Fillippovich]

[Text] A study is made of problems of regulation of the rotating frequency of a hydraulic turbine using amplitude-phase characteristics (APC) and criteria are established for stability of regulators with mobile and rigid (by introduction of a signal equivalent to the second derivative) feedback. Equations are presented for calculation of the optimal regulation time and APC for the regulator and hydraulic turbine respectively. It is noted that

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USSR

DRAGANOV, B. M., IVANOV, P. S., AMPLITUDNO-FAZOVYYE KHARAKTERISTIKI NA SISTEMATA ZA AVTOMATICHNO REGULIRANE NA VODNI TURBINI PRI V'VEZHDANE NA SIGNAL OT VTORATA Y PROIZVODNA VMEI 1975, Vol. 34, No. 7 pp 67-72 (Bulgarian)

the theoretical conclusions established earlier confirm the better qualities of the regulator in the APC case. The results of theoretical calculations of the boundaries and stability of regulation were presented in the form of graphs and diagrams. 4 figures; 3 references.

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USSR

UDC 621.45.00.113

BODROV, P.A.

ON THE EFFECT OF SIMILARITY CRITERIA OF THE OPERATING CONDITIONS OF A TURBOPROP ENGINE ON THE SIZE OF THE CORRECTION FACTORS FOR THE REDUCTION FORMULAS

Kuybyshev TRUDY KUYBYSHEVSKOGO AVIATIONNOGO INSTITUTA [Works of the Kuybyshev Aviation Institute] in Russian, No 67, 1974 pp 16-21

[From REFERATIVNYY ZHURNAL, AVIATIONNYYE I RAKETNYYE DVIGATELI No 3 1976 Abstract No 3.34.77 (resume)]

[Text] The author shows that the effect of a change in thermal capacity on the value of parameters reduced to standard atmospheric pressure depends essentially on the criteria determining the similar operating conditions for a turboprop engine. From the results of calculations on a digital computer, he obtains correction factors for the reduction formulas that allow for a change in thermal capacity. He discovers that for the same parameters, these coefficients have different values, depending on the chosen gas-turbine engine similarity criteria. Figures 2; tables 3; references 5.
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USSR

UDC 621.45.00.11:629.735.45

MASLOV, V.G.

ON SELECTING AVIATION GAS-TURBINE ENGINE PARAMETERS THAT PROVIDE THE OPTIMUM COMBINATION OF SPECIFIC WEIGHT AND SPECIFIC FUEL CONSUMPTION

Kuybyshev TRUDY KUYBYSHEVSKOGO AVIATIONNOGO INSTITUTA [Works of the Kuybyshev Aviation Institute] in Russian, No 67, 1974 pp 3-16

[From REFERATIVNYY ZHURNAL, AVIATIONNYYE I RAKETNYYE DVIGATELI No 3 1976 Abstract No 3.34.80 (resume)]

[Text] The author derives an expression for the effective specific weight of an aviation GTD [gas-turbine engine] that takes into consideration the weight of both the GTD and the fuel needed for flight. He investigates the possibility of using this expression as an optimization criterion when selecting the parameters of aviation GTD's. On the basis of statistics on GTD's developed up until 1973, he derives analytical expressions for the weight of turbojet, turbofan, and turboprop engines and auxiliary power plants in a correlational dependence on the engines' original planned parameters. He uses these equations in his investigation of the derived expression for
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USSR

MASLOV, V.G., TRUDY KUYBYSHEVSKOGO AVIATIONNOGO INSTITUTA, No 67, 1974 pp 3-16

the minimum effective specific weight of a GTD. The author compares the results of the optimization of the parameters of a helicopter GTD that were chosen with the help of his proposed technique and standard planning calculations of minimum ton-kilometer cost for a specific helicopter with a GTD. Figures 3; tables 1.

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USSR

UDC 629.7.036:533.697.4

ALEMASOV, V.YE., DREGALIN, A.F., and DAUTOV, E.A.

A NOMOGRAM FOR DETERMINING THE RELATIVE LENGTH OF THE SUPERSONIC PART OF A PROPELLING NOZZLE

Kazan' TRUDY KAZANSKOGO AVIATIONNOGO INSTITUTA [Works of the Kazan' Aviation Institute] in Russian, No 182, 1975 pp 44-45

[From REFERATIVNYY ZHURNAL, AVIATIONNYYE I RAKETNYYE DVIGATELI No 3 1976 Abstract No 3.34.89 (resume)]

[Text] The authors present a nomogram for determining the relative length $L_{su} = L_{su}/r_*$ of the supersonic part of a propelling nozzle (r_* is the radius of the critical cross-section). For a given Mach number at the outlet and an average adiabatic index k over the entire nozzle, they find the length of the supersonic part with an angular point and with a uniform flow at the outlet. Figures 1.

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USSR

UDC 629.7.036.3-226

YEVTEYEV, I.V., MITROFANOV, A.A., and SOLOKHINA, YE.V.

METHODS OF REDUCING LOSSES IN PLANE COMPRESSOR GRATINGS FOR LOW REYNOLDS NUMBER VALUES

Moscow TRUDY MOSKOVSKOGO AVIATIONNOGO INSTITUTA [Works of the Moscow Aviation Institute] in Russian, No 329, 1975 pp 12-15

[From REFERATIVNYY ZHURNAL, AVIATIONNYYE I RAKETNYYE DVIGATELI No 3 1976 Abstract No 3.34.45 (resume)]

[Text] From pressure distribution diagrams it is possible to determine the point of maximum pressure on a concave surface and to calculate the location of the flow separation point on a convex surface. If these points are connected by an opening, then under the influence of a pressure gradient there is a gas discharge to the point of the boundary layer's probable separation, which leads to turbulization of the boundary layer and the appearance of a tangential component at the profile's surface. The drilling of a number of holes along the height of the blade made it possible to lower the loss factor for reduced Reynolds numbers without increasing to any considerable extent the loss factor for high Reynolds number values. Figures 3.

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USSR

UDC 629.7.036.3:533.6

ZADYABIN, V.M., and KUROCHKIN, O.B.

EFFECT OF THE STRUCTURAL ELEMENTS IN THE WORKING PART OF THE UNIT FOR SCAVENGING PLANE GRATINGS ON THE SIZE OF THE FLOW'S ANGLE OF DEPARTURE

Moscow TRUDY MOSKOVSKOGO AVIATIONNOGO INSTITUTA [Works of the Moscow Aviation Institute] in Russian, No 329, 1975 pp 21-25

[From REFERATIVNYY ZHURNAL, AVIATIONNYYE I RAKETNYYE DVIGATELI No 3 1976 Abstract No 3.34.47]

[Text] The purpose of the authors' investigation was to discover the effect of the layout of an experimental unit's working part on the angle of departure of the flow from plane grating profiles. The grating that they studied was a plane compressor grating with an angle of curvature of the profile's midline $\epsilon = 30^\circ$, relative thickness of the profile $c = 10^\circ$, spacing $\tau = 1.2$, and vane extension $h/b = 2$. Figures 3; references 2.

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USSR

UDC 629.13.013:621.454.533.6.001.5

STEN'KIN, YE.D.

OPERATING PRINCIPLE AND FEATURES OF A FLOATING INPUT GUIDING DEVICE

Kuybyshev TRUDY KUYBYSHEVSKOGO AVIATIONNOGO INSTITUTA [Works of the Kuybyshev Aviation Institute] in Russian, No 67, 1974 pp 85-94

[From REFERATIVNYY ZHURNAL, AVIATIONNYYE I RAKETNYYE DVIGATELI No 3 1976 Abstract No 3.34.51 (resume)]

[Text] The author suggests the installation of a floating input guiding device at the intake to the first stage of a compressor instead of the well known input guiding device. He discusses the relative positioning of the profiles along the height of the vane of his proposed device, and derives relationships for determining the change in the flow's twist along the vane's height, as well as relationships for determining the device's rate of rotation in nonrated modes. The author presents examples of the calculations involved. The analytical materials may be used in engineering practice. Figures 3; references 4.

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USSR

UDC 629.7.062.3

STEN'KIN, YE.D.

A METHOD OF EVALUATING THE STATIC AND DYNAMIC PROPERTIES OF A PNEUMATIC SYSTEM FOR CONTROLLING THE OPERATING CONDITIONS OF A GAS-TURBINE ENGINE

Kuybyshev TRUDY KUYBYSHEVSKOGO AVIATIONNOGO INSTITUTA [Works of the Kuybyshev Aviation Institute] in Russian, No 67, 1974 pp 35-45

[From REFERATIVNYY ZHURNAL, AVIATIONNYYE I RAKETNYYE DVIGATELI No 3 1976 Abstract No 3.34.69 (resume)]

[Text] The author formulates a problem for studying the system needed to control a gas-turbine engine when it is operating under conditions of an irregular flow at the intake. He develops a method for determining the system's parameters, with particular emphasis on the pressure in the receiver in steady-state and transitional modes. He establishes a feedback formula that insures the programming of the given problem so that it can be solved on a computer. The author presents an example of the calculations. The materials in this article may be used in the process for creating a gas-turbine engine. Figures 3; tables 1; references 3.

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USSR

UDC 629.7.036.3:533.6

MITROFANOV, A.A.

A METHOD OF CALCULATING LOSSES IN PLANE COMPRESSOR GRATINGS FOR DIFFERENT REYNOLDS NUMBER VALUES IN THE RANGE $(0.25-2.5) \cdot 10^5$

Moscow TRUDY MOSKOVSKOGO AVIATIONNOGO INSTITUTA [Works of the Moscow Aviation Institute] in Russian, No 329, 1975 pp 3-11

[From REFERATIVNYY ZHURNAL, AVIATIONNYYE I RAKETNYYE DVIGATELI No 3 1973 Abstract No 3.34.38 (resume)]

[Text] The author presents approximate methods for calculating the characteristics of plane compressor gratings in the presence of both partial and complete separation of the laminar boundary layer from the convex surface of the profiles in the grating. He also gives an approximate method for determining the nature of the profiles' flow-past as a function of the Reynolds number's value. The method for calculating losses in the presence of partial separation of the laminar boundary layer with repeated reattachment of the turbulent boundary layer was developed on the basis of the processing of experimental data on losses and the pressure distributions on the profiles'

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USSR

MITROFANOV, A.A., TRUDY MOSKOVSKOGO AVIATIONNOGO INSTITUTA, No 329, 1975 pp 3-11

surfaces. As a result of this processing, the author found the dependence of the losses in a grating, which are related to separation of the laminar boundary layer, on the length of the separation zone. Figures 6; references 4.

USSR

UDC 629.7.036.3:621.43.056

CHERNYSH, N.K.

THEORETICAL INVESTIGATION OF THE PRESSURE DISTRIBUTION IN A DUCT WITH A TWIST

Moscow TRUDY MOSKOVSKOGO AVIATIONNOGO INSTITUTA [Works of the Moscow Aviation Institute] in Russian No 329, 1975 pp 26-34

[From REFERATIVNYY ZHURNAL, AVIATIONNYE I RAKETNYE DVIGATELI No 2 1976 Abstract No 2.34.42]

[Text] The author discusses the initial section of the fire tube of a gas-turbine engine's combustion chamber (before the secondary air jet), which section has a severe twist at the input created by a vane swirler. The theory that he advances makes it possible to obtain a high-quality picture of the pressure distribution in a cross-section and on the wall of the fire tube as a function of a number of typical parameters. Friction at the wall is not allowed for. Figures 4; references 5.

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USSR

UDC 629.7.036.3-226:533.6

KUTYSH, I.I.

A METHOD FOR THE ANALYTICAL SYNTHESIS OF PLANE, SUBSONIC GRATINGS FOR AXIAL-FLOW TURBINES

Moscow TRUDY MOSKOVSKOGO AVIATIONNOGO INSTITUTA [Works of the Moscow Aviation Institute] in Russian No 329, 1975 pp 67-72

[From REFERATIVNYY ZHURNAL, AVIATIONNYE I RAKETNYE DVIGATELI No 2 1976 Abstract No 2.34.47 (resume)]

[Text] The author proposes a method for the analytical synthesis of gratings that utilizes statistically or theoretically determined relationships between the geometric and hydrodynamic parameters of gratings, with subsequent testing of the nonseparability of the profiles' flow-past with a compressible flow of gas. Figures 1; references 4.

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USSR

UDC 629.7.036.3.001.2

PRONKIN, A.F., and OSTAPCHUK, I.I.

AN ENGINEERING METHOD FOR THE OPTIMUM PLANNING OF DISKS FOR TURBINE MACHINERY

Khar'kov VSESOYUZNAYA KONFERENTSIYA "AVTOMATIZATSIYA ISSLEDOVANIY NESUSHCHEY SPOSOBNOSTI I DLITEL'NOY PROCHNOSTI LETATEL'NYKH APPARATOV," 1975. TEZISY DOKLADOV [All-Union Conference on "Automating Research in the Load-Bearing Capacity and Long-Term Strength of Aircraft," 1975: Summaries of Reports] in Russian, 1975 p 129

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 3 1976 Abstract No 3.34.36]

[Text] The authors propose an engineering method for the optimum planning of disks used in fields of centrifugal forces and uneven heating. They give formulas for calculating a disk's optimum theoretical and practical profile. A disk's theoretical profile is an arbitrary shape. The practical profile is calculated with due consideration for the structural and technological limitations (given shape of the rim, diaphragm and hub, cooling holes, collars, and so forth).
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USSR

PRONKIN, A.F., and OSTAPCHUK, I.I., VSESOYUZNAYA KONFERENTSIYA "AVTOMATIZATSIYA ISSLEDOVANIY NESUSHCHEY SPOSOBNOSTI I DLITEL'NOY PROCHNOSTI LETATEL'NYKH APPARATOV," 1975. TEZISY DOKLADY, 1975, p 129

forth). The profiling program was drawn up and realized for a digital computer of the MINSK type. The authors present the results of the calculation of the profiles of unevenly heated rotating disks (solid and with a central opening) on a digital computer of the MINSK type. They carried out extended tests of profiled disks on an acceleration device of the VRD-500 type, at both operational and destructive rates of revolution, and also investigated the mechanical properties of the material in forged pieces and destroyed disks. The experimental and theoretical (determined with due consideration for the elastoplastic concentration of stresses) data on creep and long-term strength agreed quite well. This technique is recommended for practical use in the planning practices of plant design offices.

USSR

UDC 629.7.036.3:533.6

YEVTEYEV, I.V., and SOLOKHINA, YE.V.

EXPERIMENTAL INVESTIGATION OF THE EFFECT OF THE REYNOLDS NUMBER ON
SECONDARY LOSSES IN A PLANE COMPRESSOR GRATING

Moscow TRUDY MOSKOVSKOGO AVIATIONNOGO INSTITUTA [Works of the Moscow
Aviation Institute] in Russian, No 329, 1975 pp 15-21

[From REFERATIVNYY ZHURNAL, AVIATIONNYYE I RAKETNYYE DVIGATELI No 3
1976 Abstract No 3.34.37 (resume)]

[Text] This work is devoted to an experimental investigation of the
effect of the Reynolds number, as computed along the chord of the
profile, in the range $Re_1 = 0.3 \cdot 10^5 - 3.0 \cdot 10^5$, on the secondary losses
(and their separate components) in a plane compressor grating without
radial clearance. The angle of attack is zero and the Mach number
equals 0.3 in air. Figures 3; references 2.

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USSR

UDC 621.165:536.2

KAKHANOVICH, V. S., KERNOGA, N. P.

INFLUENCE OF INITIAL PARAMETERS OF STEAM ON ECONOMY OF OPERATION OF
CONDENSATION TURBINES

NAUCH I PRIKL PROBL ENERGETIKI in Russian, No. 2 Minsk, Vysheysh Shkola
Press 1974, pp 25-28

[Translated from REFERATIVNYY ZHURNAL 49. TURBOSTROYENIYE No. 4, 1976
Abstract No. 4.49.5]

[Text] Results are presented from analytic study of the influence of
initial steam parameters on the economy of operation of condensation
turbines for specific values of turbine power and pressure in the
condensor.

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USSR

UDC 621.438.001.24

TOPUNOV, A. M. and RODIONOV, N. G., Leningrad

TEMPERATURE STATE OF A SHELL OF A COOLED BLADE

Moscow IZVESTIYA AN SSSR, ENERGETIKA I TRANSPORT in Russian No 2
Mar-Apr 76 pp 137-146 manuscript received 22 Apr 75 and 19 Jun 75

[Abstract] The authors examine the temperature state of the shell of a cooled blade with approximate allowance for the three-dimensionality of the temperature field and with allowance for the change in the geometric and physical factors which determine the heat exchange. In the first part they give the formulation of the stationary problem of heat exchange by allowing for the variability in the thickness of the shell; they give equations of heat exchange with various ways of solving them (depending on the features of the blade design). In the second part they solve the inverse problem on seeking the optimal temperature field in front of the turbine. In the third part they cite the method of solving the direct problem. Use of difference methods permits easy allowance for the change in practically all real physical and geometric parameters which determine the heat state of the shell. This approach can also be used in other branches of technology for determ-

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USSR

TOPUNOV, A. M. and RODIONOV, N. G., IZVESTIYA AN SSSR, ENERGETIKA I TRANSPORT No 2, Mar-Apr 76, pp 137-146

ining the temperature of the shell constructions operating under complex temperature conditions, for example, for computing the cooled turbine blades with ribbing, the hulls of gas turbines, combustion chambers, nozzles, etcetera. Figures 3; references 7: manuscript received 22 Apr 74 and 19 Jun 75.

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BELASH, I. G., SOKOLOV, A. P.

EXPERIMENTAL STUDY OF THE POWER AND CAVITATION QUALITIES OF DIAGONAL HYDRAULIC TURBINES ($\theta=60^\circ$) AS FUNCTIONS OF GEOMETRIC PARAMETERS OF THE DRIVE WHEEL AND ITS CHAMBER

TR. VSES. N.-I. KONSTRUKT. I TEKHNOL. IN-TA GIDROMASHINOSTR. in Russian 1975, No. 46 pp 97-104

[Translated from REFERATIVNYY ZHURNAL 49. TURBOSTROYENIYE No. 4, 1976 Abstract No. 4.49.151 by L. P. A.]

[Text] Three blade systems are developed with identical initial parameters and identical grid densities, differing from each other in the shape of the meridional projections. The first blade system has a meridional projection with rectangular inlet and outlet edges, located approximately symmetrically relative to the rotation axis; the peripheral portion of the output elements sagged significantly into the output tube. The second blade system had meridional projection, smoothly curved upward so that its cross-section of the meridional plane, passing through the rotation axis, was elevated at the periphery (over the rotation axis) by $a=0.023 D_1$. The third blade

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USSR

BELASH, I. G., SOKOLOV, A. P., TR. VSES. N.-I. KONSTRUKT. I TEKHNOL. IN-TA GIDROMASHINOSTR. 1975, No. 46 pp 97-104

system had a meridional projection such that its curved edge closed practically on the axis of rotation, while the meridional section (plane passing through axis of rotation) had a smoothly curved shape, in which the deviation outward from the axis toward the periphery reached $a=0.065 D_1$. Around the peripheral end, this blade system over a broad range of setting angles was almost fully covered by the spherical portion of the drive wheel chamber. All three blade systems were studied in an identical flow-carrying portion, each with three drive wheel chambers differing in throat diameter ($0.95 D_1$; $0.973 D_1$ and $0.995 D_1$). In all chambers, the radius of contact of the spherical with the cylindrical portion was assumed equal to $0.2 D_g$, and therefore the influence of this dimension on the characteristics of the turbin produced was eliminated. The angle of the upper cone also remained unchanged, so that as D_g changed, only the height of the cylindrical section

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USSR

BELASH, I. G., SOKOLOV, A. P., TR. VSES. N.-I. KONSTRUKT. I TEKHNOL.
IN-TA GIDROMASHINOSTR. 1975, No. 46 pp 97-104

of the throat of the chamber changed. The experimental energetic and cavitation characteristics of the hydraulic turbine as a function of throat diameter D_g in combination with the varying blade form of the systems showed that the energetic and cavitation properties of diagonal turbines can be significantly improved by seeking out the optimal combination of shape of the meridional projection of the blades and throat of the chamber of the drive wheel. For a series D60 drive turbine, we can recommend, depending on the range of heads, the following interrelated geometric parameters of the drive wheel. For heads of 35-50 m, $1/t_b = 1.1-1.25$; $d_t = 0.50-0.54$; $Z_1 = 7-8$; for heads of 50-60 m, $1/t_b = 1.25-1.35$; $d_t = 0.54-0.56$; $Z_1 = 8-9$. 7 figures; 5 references.

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USSR

UDC 621.165.001.8.735

RISOVICH, A. I., BURACHKOV, B. M., DONTSOVA, G. P.

SOME RESULTS OF THE INVESTIGATION OF THE THERMAL STATE OF THE ROTOR OF
A REVERSE TURBINE BY THE METHOD OF ELECTRIC MODELING

SUDOVYYE MASHINY I MEKHANIZMY in Russian No. 6 Moscow 1975, pp 93-97

[Translated from REFERATIVNYY ZHURNAL 49. TURBOSTROYENIYE No. 6, 1976
Abstract No. 6.49.44]

[Text] Results are presented from studies of the thermal state of the rotor of a reverse turbine by the method of electric modeling in the cross-section of the disc of the first stage. It is shown that in this sector of the rotor during reversing the total stress is not over the yield point. 2 figures; 10 references.

USSR

UDC 621.438.018:622.691.5:621.51

MOROZOV, B. I., PCHELKIN, V. V., MERKULOV, V. A.

TESTING AND IMPROVEMENT OF UNITS FROM INSTALLATIONS FOR EVAPORATIVE COOLING OF GAS TURBINE CYCLE WATER

PROYSHENIYE EFFEKTIVN. TRANSP. GAZA in Russian, Moscow 1975, pp 34-44

[Translated from REFERATIVNYY ZHURNAL 49. TURBOSTROYENIYE No. 4, 1976 Abstract No. 4.49.123 by L. P. A.]

[Text] Installations for water evaporative cooling (EC) are intended to increase the effectiveness of gas pumping installations during the summer by cooling the recycled air at the inlet to the compressor. The installations include an evaporation device (ED), pump, filter and circulating water tank, supply line and drainage line, pipes and associated equipment. Testing of a pilot-scale model and the experience of operation of industrial installations demonstrate the need for a number of refinements to some units of the installation. Modernization of the design of EC has allowed the mass of evaporative devices in the GT-750-6 unit to be reduced from 3360 to 1700 kg, those in the GTK-10 from 4400 to 2500 kg. The evaporative units

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USSR

MOROZOV, B. I., PCHELKIN, V. V., MERKULOV, V. A., PROYSENIYE EFFEKTIVN. TRANSP. GAZA 1975, pp 34-44

are standardized. The EC unit for the GT-750-6 includes two sections, that for the GTK-10-3 sections. The design of the evaporative device has been improved (general view presented), the life of the filtering material has been increased, a new design of sprayer pumps has been developed, in which the water is sprayed by installation of a sprayer comb at the outlet of the nozzle of the sprayer body (design presented); the sealing of the air lines is improved, as is that of the bypass valves; recycled air cooling efficiency is increased by 20-40%. The Research Institute for Gas is developing designs for an automatic bypass with a smooth dependence of angle of opening on hydraulic drag. 4 figures.

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USSR

UDC 621.165.001.8.735

RISOVICH, A. I., BURACHKOV, B. M.

THE THERMALLY STRESSED STATE OF THE ROTOR OF A REVERSE TURBINE DURING REVERSING

SB. NAUCH TR. ODESSK. IN-T INZH. MOR. FLOTA in Russian 1976, No. 7
pp 81-88

[Translated from REFERTIVNYY ZHURNAL 49. TURBOSTROYENIYE No. 6, 1976
Abstract No. 6.49.45]

[Text] Based on the results of electric modeling of the rotor of a reverse turbine from a marine turbine, R grids are used to analyze the heat stress state of a rotor during operation in reverse. Recommendations are presented allowing the level of thermal stresses to be reduced and reliability and durability of the rotor to be increased. 2 figures; 11 references

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USSR

UDC 621.438.001.2

SAPRYKIN, G. S., GALUSHKO, V. F.

PREDICTION OF WEIGHT AND COST INDICATORS OF GAS TURBINE INSTALLATIONS IN THE PLANNING STAGE

Leningrad ENERGO MASHINOSTROYENIYE in Russian No. 6, 1976 pp 3-5

[Abstract] Statistical studies show that there is a definite correlation relationship between the weight (cost) indicators and basic parameters (unit power, gas temperature before turbine, pressure increase in compressor, etc.). Correlation equations are produced, allowing calculation of the weight and cost indicators of gas turbine units of any degree of complexity in the planning stage, with a certain degree of error. The calculation formulas for determination of the weight and cost of a gas turbine can be additionally refined by determination of the cost in stages by the method of the Central Scientific Research, Planning and Design Boiler and Turbine Institute, including calculation of weight indicators, materials consumption norms, materials costs, labor consumption and cost of processing.

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USSR

UDC 621.438.001.5:533.6

SUDAREV, A. V., MAYEV, V. A., GORYACHEVA, M. V.

THE FLOW OF A TURBULENT SEMILIMITED JET IN A CONICAL PIPE BEYOND A CIRCULAR VORTEXER

Leningrad ENERGOMASHINOSTROYENIYE in Russian No. 6, 1976 pp 18-21

[Abstract] In gas turbine combustion chambers, circular conical semibounded twisted streams are used. Works published on this problem do not cover the necessary range of defining geometric factors and do not allow the influence of the twisting angle of the stream, hub ratio of the vortexer and aperture angle of the cone on the distribution of velocities over the radius and length of the conical pipe to be determined. Therefore, at the Neva Machine Building Plant imeni V. I. Lenin, an experimental study was performed of the aerodynamics of a circular turbulent jet of air propagating along the interior surface of a cone. Based on the analysis performed it can be concluded that as the initial twisting of a semilimited conical stream is increased with unchanged ψ and β , the transverse movement increases, and velocity gradients in the boundary layer near the wall increase.

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USSR

UDC 620.1

TRET'YACHENKO, G. N., KONEV, V. A., KRAVCHUK, L. V., KURIAT, R. I.

RUPTURE OF GAS TURBINE BLADES DURING HEAT CYCLING IN A GAS STREAM CONTAINING SEAWATER SALTS

PROCHNOST' MATERIALOV I KONSTRUKTSIY in Russian, Kiev, Nauk Dumka Press 1975, pp 276-286

[Translated from REFERATIVNYY ZHURNAL 49. TURBOSTROYENIYE No. 1, 1976 Abstract No. 1.49.160]

[Text] Quantitative regularities are presented concerning the influence of seawater salts on the durability of the nozzle blades of marine gas turbines operating under marine conditions. Based on the results produced, the problem of possible reasons for reduced efficiency of gas turbine engine blades under these conditions is analyzed. 6 figures; 6 references.

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USSR

UDC 621.824-433.53:001.24

LEYKIN, A. S.

SOME PROBLEMS OF THE DETERMINATION OF OPTIMAL PROFILES OF MACHINE PART FILLETS

PROCHNOST' MATERIALOV I KONSTRUKSTIY in Russian Kiev Nauk Dumka Press, 1975 pp 253-264

[Translated from REFERATIVNYY ZHURNAL 49. TURBOSTROYENIYE No. 1, 1976 Abstract No. 1.49.39]

[Text] Methods and formulas are developed for calculation related to the determination of the optimal profiles of fillets of various types of machine parts (with straight and curved profile of contacting surfaces of parts), based on a method suggested by the author. As an example, the possibility is demonstrated of using the results of investigation for the base clamps of turbine blades. 4 figures; 8 references.

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USSR

UDC 621.482

ANDERSON, J. G.

CYCLE FOR THE STEAM TURBINE PLANT FOR A GEOTHERMAL ELECTRIC STATION

Moscow GEOTHERMAL'NAYA ENERGIYA [Geothermal Energy, Collection] in Russian, Mir, 1975 pp 172-184

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 5 1976 Abstract 5S124]

[Text] The characteristics and advantages are given for geothermal plants in which the heat of the geothermal medium is used to obtain steam from low-boiling-point fluids. For a 163°C geothermal water temperature, the best secondary working fluid is isobutane. For a 27°C condensate temperature, the specific volume of water vapor is 39.5 m³/kg but is 0.1 m³/kg for isobutane vapor. Here the low-temperature condensation of an isobutane turbine is much less and is cheaper than for a steam turbine. The efficiency of the plant is higher, and there is also less noise and corrosion. The first isobutane turbine was made with a capacity of 9 MW at 7,000 rpm. The turbine, which has a casing with an internal diameter of 900 mm and only one external seal, requires practically no maintenance. References 7.

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USSR

UDC 629.78.018.1

CHERNYAVSKIY, S.YU., BAULIN, N.N., and MKRTUMOV, A.S.

A PHOTOELECTRIC SYSTEM FOR DISPLAYING A FLYING MODEL IN BALLISTIC RESEARCH

Moscow NAUCHNYYE TRUDY INSTITUTA MEKHANIKI MOSKOVSKOGO UNIVERSITETA [Scientific Works From the Institute of Mechanics, Moscow State University] in Russian, No 39, 1975 pp 103-108

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No 7 1976 Abstract No 7.41.110 by T.A.Ye.]

[Text] The authors describe the photoelectric system for displaying a model flying at hypersonic speeds that is used in the aeroballistic installation at Moscow State University's Institute of Mechanics. The system consists of three identical units for displaying the appearance of the model in a given section of the ballistic trace and flight-time recorders placed on two bases between these units. The system makes it possible to compute the average flight speed and deceleration of the model and, consequently, its resistance coefficient. The authors present a structural diagram of the display unit and discuss the display system's errors. Figures 3; references 5.
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USSR

UDC 629.78.018.1

CHERNYAVSKIY, S.YU., POPOV, N.N., SIBILEV, V.YU., BAULIN, N.N., and MKRTUMOV, A.S.

A LIGHT-GAS BALLISTIC INSTALLATION

Moscow NAUCHNYYE TRUDY INSTITUTA MEKHANIKI MOSKOVSKOGO UNIVERSITETA [Scientific Works From the Institute of Mechanics, Moscow State University] in Russian, No 39, 1975 pp 92-102

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No 7 1976 Abstract No 7.41.112 (resume)]

[Text] Researchers at Moscow State University's Institute of Mechanics have built an experimental device for aerophysical investigations of hypersonic currents on models 7.9 and 12.7 mm in diameter and maximum speeds of 7-8 km/sec. In this article they present the designs of the two-stage light-gas guns used in this device and the equipment used to photograph the teplerogrammy [Töpler patterns] of the models' flow-past. The light-gas gun used to accelerate the models that are 7.9 mm in diameter consists of a powder chamber, a piston barrel, a high-pressure chamber, and a ballistic barrel. The powder
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USSR

CHERNYAVSKIY, S.YU., POPOV, N.N., et al., NAUCHNYYE TRUDY INSTITUTA MEKHANIKA MOSKOVSKOGO UNIVERSITETA, No 39, 1975 pp 92-102

chamber is fitted with a breechplug with electric inputs for igniting the powder charge. This chamber's strength makes it possible to use powder charges with a total output of 450 kg/dm^2 [sic] that weigh up to 500 g. The powder chamber is connected to one end of the piston barrel, which is 5 m long and has an inner diameter of 34 mm. The other end of this barrel is connected to the high-pressure chamber. The axial opening in this chamber has two cylindrical sections that are joined by a conical connector with a taper angle of $\alpha = 8^\circ$. The intake opening's diameter is the same as the piston barrel's inner diameter, while that of the outlet opening equals the ballistic barrel's inner diameter. The high-pressure chamber has a double-layer design and is rated for pressures up to $10,000 \text{ kg/cm}^2$. The outlet part of the high-pressure chamber is fitted with an assembly for connecting the ballistic barrel and attaching a separating membrane. The membrane is made of stainless steel and opens at an excess pressure of 300 kg/cm^2 . Before the experiment begins, the model and the membrane are placed in the breech part of the ballistic barrel, which is then fastened to the high-pressure chamber. A polyethylene piston weighing 225 g and fitted with a sealing lip is inserted in the

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USSR

CHERNYAVSKIY, S.YU., POPOV, N.N., et al., NAUCHNYYE TRUDY INSTITUTA MEKHANIKI MOSKOVSKOGO UNIVERSITETA, No 39, 1975 pp 92-102

piston barrel's breech end. After this, the powder charge and an electrical igniter are placed in the powder chamber and the chamber's breechplug is locked. The piston barrel and the high-pressure chamber are evacuated by a pre-evacuation pump to a pressure of 0.1 mm Hg and then filled with a light gas (hydrogen or helium). The ballistic barrel is connected to the evacuated ballistic trace and pumped out along with it. When the powder is ignited, the piston's sealing lip is sheared away and the piston, moving along the barrel, compresses the working gas. When the given pressure is reached the separating membrane is torn away and the model begins to accelerate in the ballistic barrel. When the polyethylene piston strikes the conical part of the high-pressure chamber, it is deformed. Its leading edge begins to move faster than its trailing edge. In connection with this, compression waves exceeding the given pressure on the model move forward along the flow. The process in the gun is completed by the braking of the piston in the conical part of the high-pressure chamber. The light-gas gun used with the models 12.7 mm in diameter is analogous in design to the one described above, and differs from it

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USSR

CHERNYAVSKIY, S.YU., POPOV, N.N., et al., NAUCHNYYE TRUDY INSTITUTA MEKHANIKI MOSKOVSKOGO UNIVERSITETA, No 39, 1975 pp 92-102

only in the diameters of the piston (50 mm) and ballistic (12.7 mm) barrel openings and the high-pressure chamber itself, as well as in the increased weight of the polyethylene piston (500 g). The models that are accelerated are made of Duralumin and steel. Their speed is measured with the help of sensors (induction and photoelectric) and an electronic recording system. Figures 17; references 10.

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USSR

UDC 629.7.036.3:625.768.5:625.717.2].001

KRASNOV, V. F.

EXPERIMENTAL INVESTIGATION OF THE OPERATION OF A SYSTEM FOR TRIGGERING AN AI-20 ENGINE FROM AN ON-BOARD ASSEMBLY FOR TRIGGERING THE MVT-2 MACHINE

Moscow NAZEM PRIMENENIYE AVIADVIGATELEY V NAR KH-VE [Ground Application of Aviation Engines in the National Economy, Collection of Works] in Russian No 1, 1975 pp 48-55

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 5 1976 Abstract No 5.34.116]

[Text] The author cites data from experimental investigations of the operation of a system for triggering the AI-20 engine for the purpose of decreasing the power required by the starters and its smooth change in the process of triggering the AI-20 engines. Figures 5.

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USSR

UDC 621.452.3.01:625.768.5:625.717

SEMENOV, V. YA. and GABOVICH, M. V.

EXPERIMENTAL INVESTIGATION OF THE PARAMETERS OF A JET GENERATED BY THE AI-20 ENGINE USING AN ARRAY OF PROFILES FOR DEFLECTION OF THE JET

Moscow NAZEM PRIMENENIYE AVIADVIGATELEY V NAR KH-VE [Ground Application of Aviation Engines in the National Economy, Collection of Works] in Russian, No 1, 1975 pp 90-95

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 5 1976 Abstract No 5.34.99]

[Text] The authors cite data on experimental investigations of the dependence of the productivity of gas-jet machines in the process of cleaning coatings on atmospheric deposits and on the conditions of conducting the jet to the surface to be treated. Authors' abstract.

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USSR

UDC 621.452.3.01:625.768.5:625.717

SAZHIN, V. A., YAKOVLEV, YE. P. and GORYUNOVA, V. S.

EXPERIMENTAL INVESTIGATION OF THE VELOCITY AND TEMPERATURE AND VELOCITY FIELDS OF GAS-AIR JETS OF A GROUND CURRENT GENERATOR ON THE BASE OF THE AVIATION ENGINE D-20P

Moscow NAZEM PRIMENENIYE AVIADVIGATELEY V NAR KH-VE [Ground Application of Aviation Engines in the National Economy, Collection of Works] in Russian, No 1, 1975 pp 96-104

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 5 1976 Abstract No 5.34.98]

[Text] The authors describe experiments on investigating the temperature and velocity fields of working jets directed by a gas-jet assembly on the base of the D-20P engine, designed for utilization on airport ice-cleansing machines. Authors' abstract.

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USSR

UDC 629.7.036.3.001.4:533.6.071

BELYAYEV, V. YA., ILLARIONOV, A. M. and PONOMAREV, N. N.

OPTIMIZATION OF THE EXHAUSTERS OF SUPERSONIC WIND TUNNELS PLANNED ON THE BASE OF AVIATION ENGINES

Moscow NAZEM PRIMENENIYE AVIADVIGATELEY V NAR KH-VE [Ground Application of Aviation Engines in the National Economy, Collection of Works] in Russian, No 1, 1975 pp 184-190

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 5 1976 Abstract No 5.34.97]

[Text] The authors examine the use of a 2-circuit aviation engine as an exhaustor of supersonic wind tunnels. They found the optimal dimensions of the flow part and the operating mode of the engine. They give the diagram of the set-up and present the results of the computations on an electronic computer. Authors' abstract.

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USSR

UDC 629.7.036.3:662.75

GARAZHA, V.V., DAVIDENKO, G.A., CHIRKOV, S.V., and CHERNENKO, ZH.S.

AN EXPERIMENTAL ELECTRIC FILTER FOR REMOVING WATER FROM JET FUELS

Kiev VOPROSY NADEZHNOСТИ GIDRAVLICHEKIKH SISTEM LETATEL'NYKH APPARATOV [Questions on the Reliability of Aircraft Hydraulic Systems, Collection of Works] in Russian No 1, 1975 pp 36-42

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 2 1976 Abstract No 2.34.74 (resume)]

[Text] The authors present the results of their investigation of an experimental prototype of an electric filter for removing water from jet fuels. They give a brief description of the design and operating principle, and list the results obtained during experimental investigations of the filter. Depending on the fuel flow rate through the electric filter, the filtration factor for emulsified water in the fuel is 80-95 percent. Figures 6; references 12.

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USSR

BERTYN', V. R., POLYAKOVA, A. V., KHARITONOVA, V. T.

EXPERIMENTAL STUDY OF THE FLOW OF A GAS IN A PERFORATED GAUGE SECTION OF A TRANSSONIC WIND TUNNEL WITH ACCELERATION OF THE FLOW BEFORE THE EJECTOR PORTION

UCH. ZAP. TSENTR. AEROGIDRODINAM. IN-TA in Russian 1975, Vol. 6 No. 6 pp 104-108

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No. 7B1246 from the resume]

[Text] Results are presented from an experimental study of the basic gas dynamic characteristics of the flow of a gas in the perforated gauge section of a transsonic wind tunnel, equipped with an acceleration gas flow section before the ejector portion. It is shown that with a Mach number of the gas stream in the gauge section of $M \approx 1.4$, the use of such an acceleration section leads to a drop in total losses of gas pressure of about 8% and an increase in $M_{\max}$ by about 0.05.

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EAST GERMANY

UDC: 629.135.423:528.72

BEYER, A., graduate engineer, Geodesy and Cartography Combine State Enterprise, Research Center, Leipzig

STUDIES ON THE USE OF THE HELICOPTER FOR SPECIAL PHOTOGRAMMETRIC TASKS

East Berlin VERMESSUNGSTECHNIK in German Vol 24 No 2, Feb 76 pp 50-53 manuscript received 17 Oct 75

[Abstract] Test flights were carried out using the MRB 15/2323 aerial survey camera of Leitz; the helicopter (Mi-4; picture scale: 1000) was compared to the airplane (AN-2; picture scale: 1500) in aerial triangulation. Analytical and instrument-numerical model evaluations were made, and adjustment need studies were carried out with the help of rail track observations. Significant advantages for the helicopter were found as a result of larger-scale aerial photographs. Diffuse light conditions were found best. The accuracy of the camera used was adequate for the helicopter. Accuracy increase of up to 25% was found with the helicopter for reference points. Tables 4; figures 2; references 3: all German.

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USSR

UDC 621.311.25:621.039(47+57)

NIKITIN, V. S., SERGEYEV, YU. A., KHRILEV, L. S. and SHADRIN, A. P.

QUESTIONS OF ENERGY SUPPLY OF REGIONS OF THE FAR NORTH OF THE USSR
ON THE BASIS OF NUCLEAR ENERGY SOURCES

Yakutsk SB DOKL VSES NAUCH-TEKHN SOVESHCH. PROBL ENERG KRAYN SEV-
ERA [Collection of Reports of the Scientific-Technical Conference
on Problems of Energy in the Far North] in Russian, Part 1, 1975
pp 28-40

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 4 1976 Abstract No
4U28 by G. I. Korotkina]

[Text] Considerable attention is being paid to questions of electrical and heat supply of towns and villages located in remote regions of the Far North. In the past the basic source of energy supply in the regions of the Far North has been diesel electric power plants and boiler plants operating on coal. The authors examine the possibility of using atomic energy for these purposes. Atomic electric power plants with water-water nuclear reactors

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USSR

NIKITIN, V. S., SERGEYEV, YU.A., KHRILEV, L. S. and SHADRIN, A. P.,
SB DOKL VSES NAUCH-TEKHN SOVESHCH. PROBL ENERG KRAYN SEV-
ERA, Part 1, 1975 pp 28-40 [From REFERATIVNYY ZHURNAL, TEPLOENER-
GETIKA No 4 1976 Abstract No 4U28]

have received the greatest usage in world-wide atomic energetics. They are constructed at Novo-Voronezhsk and Kol'sk power plants. and are being constructed and will be constructed at the Armenian and a number of other atomic power plants. A standard technical project has been developed for the block-transportable atomic thermoelectric power plant "Sever-2", consisting of two reactors of the IVVER type with a thermal power of 14.5 MW and two turbo-generator devices with thermofriction turbines with a maximum electric power of 3 MW and maximum heat takeoff of 9 Gcal/h. Table 1; references 12.

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USSR

UDC 621.039.6

KOMAR, YE. G., MALYSHEV, I. F., MONOSZON, N. A., MURATOV, V. P., ODINTSOV, V. N., ROZHDESTVENSKIY, B. V., SAMSONOV, G. N. and STOLOV, A. M.

ENGINEERING QUESTIONS IN CREATING THE EXPERIMENTAL DEVICE TOKAMAK-10

DOKL VSES SOVESHCH PO INZH PROBL UPRAVLYAYEM TERMOYADER SINTEZA, 1974, T 1 [Reports of the All-Union Conference on Engineering Problems of Controllable Thermonuclear Synthesis, 1974, Vol 1] in Russian, 1975 pp 118-126

[From REFERATIVNYY ZHURNAL, TEPLONERGETIKA No 6 1976 Abstract No 6U86 by Ye. A. Kremenevskaya]

[Text] The Tokamak-10 is designed for investigating a toroidal quasistationary discharge in a strong longitudinal magnetic field. The authors suggest producing a temperature on the device for the ions on the order of 1 keV in a quasistationary plasma with a density of 10^{14} cm⁻³. Here one must observe the physical thermonuclear reaction which is physically intense. The device is a complex

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USSR

KOMAR, YE. G., MALYSHEV, I. F., MONOSZON, N. A., MURATOV, V. P., ODINTSOV, V. N., ROZHDESTVENSKIY, B. V., SAMSONOV, G. N. and STOLOV, A. M., DOKL VSES SOVESHCH PO INZH PROBL UPRAVLYAYEM TERMOYADER SINTEZA, 1974, T 1, 1975 pp 118-126 [From REFERATIVNYY ZHURNAL, TEPLONERGETIKA No 6 1976 Abstract No 6U86]

consisting of a magnetic system, a system of pumping, a system of control and monitoring the operation of the device, a system of measurement and monitoring the plasma parameters, a system of collection, processing and storage of information. The authors give the basic parameters of the Tokamak-10. Figures 2.

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USSR

UDC 621.039.6

ORLINSKIY, D. V. and POPKOV, G. N., Institute of Atomic Energy imeni I. V. Kurchatov

ON THE DIAGNOSTICS COMPLEX OF THE DEMONSTRATION THERMONUCLEAR REACTOR TOKAMAK-20 (T-20)

Moscow O KOMPLEKSE DIAGNOSTIKI DEMONSTRATSIONNOGO TERMOYADERNOGO REAKTORA TOKAMAK-20 (T-20) [On the Diagnostics Complex of the Demonstration Thermonuclear Reactor Tokamak-20 (T-20)] in Russian, 1975, 12 pp

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 6 1976 Abstract No 6U87 by V. M. Gukov]

[Text] The authors discuss the general aspects of the diagnostics of plasma on an experimental thermonuclear device, the T-20. The basic problems of the diagnostics are assumed to be first of all the possibly more complete investigations of the physical processes which prevent reaching a high temperature and duration of holding the energy in the plasma and secondly treatment of the method of measuring relative to the thermonuclear reactor. The

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USSR

ORLINSKIY, B. V. and POPKOV, G. N., O KOMPLEKSE DIAGNOSTIKI DEMONSTRATSIONNOGO TERMOYADERNOGO REAKTORA TOKAMAK-20 (T-20), 1975, 12 pp [From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 6 1976 Abstract No 6U87]

dynamics of the plasma on the T-20 are based on the diagnostics complex developed and tested on existing Tokamak type devices. The authors describe the features of the dynamics complex caused by the requirements imposed on the dynamics of a future reactor. They examine the methods of determining the basic parameters of the plasma and the discharge (first group of methods) and the the methods of second group for studying the various physical phenomena. They give logic circuits of the interaction between the measurable values for each group of methods. They give the circuit of the location of the diagnostic sections of the chamber, measuring connectors and give a table of the suggested arrangement of the measuring devices. They briefly describe the program of investigations and in accordance with it they formulate by stages the problems imposed on the diagnostics complex. Figures 3.

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USSR

UDC 621.039.6.002.5

VOLOBUYEV, A. N., IVANOV, D. P., KEYLIN, V. YE., SVISTEL'NIK, V. V., SKORLUPKIN, I. D., STAVISSKIY, B. A. and SHARYKIN, V. A.

CRYOGENIC COMPLEX OF THE TOKAMAK-7 DEVICE

DOKL VSES SOVESHCH PO INZH PROBL UPRAVLYAYEM TERMOYADER SINTEZA [Reports of the All-Union Conference on Engineering Problems of Controllable Thermonuclear Synthesis] in Russian, 1975, pp 189-200

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 6 1976 Abstract No 6U90 by G. I. Korotkina]

[Text] The planned cryogenic complex is designed for ensuring working temperature conditions of the Tokamak-7, the first Tokamak with superconducting coils for the longitudinal field. The cryogenic complex includes: a system of nitrogen cooling, 2 serial liquefying stations, a cooling block, current inlet block, a system of regulating the flows of the cooling agents. The basic characteristics of the cooling block are: productivity of the compressor 1200 m³/hour, pressure of the compressed helium 20 kgs/

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USSR

VOLOBUYEV, A. N., IVANOV, D. P., KEYLIN, V. YE., SVISTEL'NIK, V. V., SKORLUPKIN, I. D., STAVISSKIY, B. A. and SHARYKIN, V. A., DOKL VSES SOVESHCH PO INZH PROBL UPRAVLYAYEM TERMOYADER SINTEZA, 1975 pp 189-200 [From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 6 1976 Abstract No 6U90]

cm², pressure of the helium in the collector 1.1 kgs/cm², pressure of the helium entering the reactor 15-3 kgs/cm², pressure in the nitrogen bath 0.27 kgs/cm², temperature of the nitrogen 68 K, flow rate of the nitrogen in the working mode 145 kg/hour, productivity of the cooling block in the mode of liquefaction 200 l/hour, productivity of the refrigerator (T = 4.5 K) 600 W. The authors give the basic mass characteristics of the elements of the device cooled by the coolants. Figures 5; tables 2.

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USSR

UDC 621.039.6.002.5

SIMONOV, V. A., KOLLEROV, E. P., MASLENNIKOV, YE. A., ORLOV, P. YE.,
POPKOV, G. N. and ROYENKO, V. A.

VACUUM SYSTEM OF THE THERMONUCLEAR DEVICE TOKAMAK-10

Leningrad DOKL VSES SOVESHCH PO INZH PROBL UPRAVLYAYEM TERMOYADER
SINTEZA, 1974, T 1 [Reports of the All-Union Conference on Engin-
eering Problems of Controllable Thermonuclear Synthesis, 1974,
Vol 1, 1975, pp 150-164

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 6 1976 Abstract No
6U91 by G. I. Korotkina]

[Text] The authors describe a vacuum system for the thermonuclear
device Tokamak-10. To produce a pure high-temperature plasma it
is necessary that in the process of pumping on the surface no non-
volatile films are formed which are not removed by heating. The
pumping system of the external chamber consists of two blocks,
each of which accomplishes simultaneous pumping of two separate
chamber volumes. The block includes: 2 turbomolecular pumps
TMI-200 A, 2 adsorption pumps type SSNA-1.5, 4 heated gaps type

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USSR

SIMONOV, V. A., KOLLEROV, E. P., MASLENNIKOV, YE. A., ORLOV, P.
YE., POPKOV, G. N. and ROYENKO, V. A., DOKL VSES SOVESHCH PO INZH
PROBL UPRAVLYAYEM TERMOYADER SINTEZA, 1974, T 1, 1975 pp 150-164
[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 6 1976 Abstract No
6U91]

DU 160 RSU-A and DU 260 RSU-A, 4 heated gaps type DU 50 TE, a mag-
netic valve MK-80 and a thermosorption trap type LTS-80. The
speed of pumping air by the block in cross section of the output
flange in the pressure range of $1 \cdot 10^{-4}$ - $5 \cdot 10^{-9}$ mm Hg is greater
than or equal to 300 l/s. The authors give the schematic of block
No 1 and show the parameters of the No 2 block. Figures 9; tables:
2.

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USSR

UDC 621.039.6.002.5

VAKHRUSHIN, YU. P., IZOTOV, YE. N., ODINTSOV, V. N., SAKSAGANSKIY, G. L., SEREBRENNIKOV, D. V. and FEFELOV, P. A.

VACUUM SYSTEM FOR THE EXPERIMENTAL THERMONUCLEAR DEVICE TM-4

Leningrad DOKL VSES SOVESHCH PO INZH PROBL UPRAVLYAYEM TERMOYADER SINTEZA, 1974. T 1 [Reports of the All-Union Conference on Engineering Problems of Controllable Thermonuclear Synthesis, 1974. Vol 1] in Russian, 1975 pp 174-183

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 6 1976 Abstract No 6U92 by G. I. Korotkina]

[Text] The feature of the TM-4 is that the discharge chamber in the process of exploitation is located in a "hot" state and its temperature is held at 1000° C. Structurally the vacuum system of the thermonuclear device consists of the following elements: a discharge chamber, an external chamber, a system for pumping and one for measuring the vacuum. The vacuum system is constructed in the form of six individual pumping blocks, each of which contains a turbomolecular pump, a mechanical pump and 2 sorption

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USSR

VAKHRUSHIN, YU. P., IZOTOV, YE. N., ODINTSOV, V. N., SAKSAGANSKIY, G. L., SEREBRENNIKOV, D. V. and FEFELOV, P. A., DOKL VSES SOVESHCH PO INZH PROBL UPRAVLYAYEM TERMOYADER SINTEZA, 1974, T 1, 1975 pp 174-183 [From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 6 1976 Abstract No 6U92]

pumps. The two blocks are used for pumping the external chamber to $5 \cdot 10^{-4}$ mm Hg, and four blocks are used for pumping the discharge chamber to a pressure of $1 \cdot 10^{-7}$ mm Hg. Figures 5; references 4.

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AMELIN, V. Z., BIRYUKOV, O. V., VISHNEVETSKIY, V. N., GEOGRIYEVSKIY, A. V., GOROKHOV, V. P., DIKIY, A. G., DRUNOV, V. A., ZHUKOV, V. N., ZISER, V. Ye., KITAYEVSKIY, L. Kh., KUZNETSOV, Yu. K., LOGINOV, A. S., POGOZHEV, D. P., SAMOYLOV, V. P., SERGEYEV, Yu. F., SMIRNOV, V. G., SUPRUNENKO, V. A., TOLOK, V. T., TKHORYAK, A. F., and PELETMINSKAYA, V. G.

THE EXPERIMENTAL STELLARATOR-TYPE THERMONUCLEAR DEVICE 'URAGAN-2'

Leningrad DOKLADY VSESOYUZNOGO SOVESHCHANIYA PO INZHINERNYM PROBLEMAM UPRAVLYAYEMOGO TERMOYADERNOGO SINTEZA, LENINGRAD 1974 [Transactions of the All-Union Conference on Engineering Problems of Controlled Thermonuclear Fusion, Leningrad 1974] in Russian Vol 4, 1975 pp 314-325

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 7 1976 Abstract No 7U117 by G. I. Korotkina]

[Text] The triple racetrack-stellarator "Uragan-1M" was modeled and labeled "Uragan-2" ("U-2") for further development of the research on the stellarator

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USSR

AMELIN, V. Z., et al., DOKLADY VSESOYUZNOGO SOVESHCHANIYA PO INZHINERNYM PROBLEMAM UPRAVLYAYEMOGO TERMOYADERNOGO SINTEZA, LENINGRAD 1974, Vol 4, 1975 pp 314-325

program. The basic parameters of the "U-2" are: longitudinal magnetic field strength $H_0 = 20,000$ oersted, period of the magnetic field of the coil windings $T = 130$ ms, rotational transformation angle $i_0 = 360^\circ$, value of the "broadening" $S_0 = 0.12$, average radius of limits of the undisturbed magnetic surface $r_0 = 7$ cm, number of filed periods $m = 18$, coil winding inclination angle $\alpha = 33^\circ$, $\beta \approx 5,000$, the minor radius of the coil windings $a_c = 12$ cm, the aspect ratio $A = R/a_c = 9.16$. The magnetic system of the "U-2" stellarator is discussed. Data were obtained that show that the magnetic surfaces on the straight-line parts can be joined without helical windings. Illustrations 4; References 4.

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USSR

UDC 621.039.58.001.4

BADYAYEV, V. V., GLUSHCHENKO, A. I., YEGOROV, YU.A., PAVLOV, S. D., PANKRAT'YEV, YU. V., KHANDAMIROV, YU.E. and SHCHERBINA, V. G.

SEVERAL RESULTS FROM AN EXPERIMENTAL CHECKING OF THE PROTECTION OF THE RBM-K-1000 REACTOR

Moscow RADIATS BEZOPASN I ZASHCHITA AES [Radiation Safety and Protection of Atomic Electric Power Plants, Collection of Works] in Russian, No 1, 1975, Izd-vo Atomizdat, pp 182-191

[From REFERATIVNYY ZHURNAL, TEPLONERGETIKA No 6 1976 Abstract No 6U171 by N. O. Kolodiy]

[Text] The authors discuss the results of experimental investigations of the radiation situation on the first block of the Leningrad Atomic Electric Power Plant during the period of physical and energy startups and yield of the plant for nominal power for the purpose of determining the effectiveness of biological protection, checking the correctness of the project computations and quality of assembly of the protection. The measurements of the distribution of flows of fast and thermal neutrons and dose strength of

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USSR

BADYAYEV, V. V., GLUSHCHENKO, A. I., YEGOROV, YU.A., PAVLOV, S. D., PANKRAT'YEV, YU. V., KHANDAMIROV, YU. E. and SHCHERBINA, V.G., RADIATS BEZOPASN I ZASHCHITA AES, No 1, 1975, pp 182-191 [From REFERATIVNYY ZHURNAL, TEPLONERGETIKA No 6 1976 Abstract No 6U171]

the gamma radiation along the height of the technological channels of the scram system in the period of physical startup showed that the methods of computation and programs used in the planning of the nuclear reactor protection are basically proper and describe the nuclear reactor as a source of radiation, but give 2.5 times too-high values of the dose power in the first series of the lateral reflector and behind the housing. Measurements of the dose power and neutrons in the central hall of the reactor with a thermal power of 700, 1370, 1600, , 2600 MW showed that the basic contribution (50%) to the dose power is given by the group of gamma quanta with an energy of 5-7 MeV; the basic source of radiation is the radioactive heat carrier in vapor-water coupling under the upper cover of the reactor. Radiation from the separator to the radiation situation in the hall has no influence. The value of the neutron dose power does not exceed the projected. Measurements of the dose power in boxes, in the basic equipment of the technological circuit on the areas of the turbogenerators during

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USSR

BADYAYEV, V. V., GLUSHCHENKO, A. I., YEGOROV, YU. A., PAVLOV, S. D.,
PANKRAT'YEV, YU.V., KHANDAMIROV, YU.E. and SHCHERBINA, V. G.,
RADIATS BEZOPASN I ZASHCHITA AES, No 1, 1975, pp 182-191 [From
REFERATIVNYY ZHURNAL, TEPLONERGETIKA No 6 1976 Abstract No 6U171]

operation of the plant at different levels of power showed that
the protection planned and constructed at the plant ensures re-
duction of dose power and neutron power to levels corresponding to
the requirements of health norms. Figures 5; tables 3; referen-
ces 7.

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USSR

UDC 518:517.91/94

ZIMNITSKIY, V. A., KIRILLOVA, L. K., RAKITSKIY, YU. V., SOL'NITSEV, R. I.,
Leningrad Polytechnical Institute imeni M. I. Kalinin

MODELING OF GYROSCOPIC DEVICES BY DIGITAL COMPUTER

Leningrad IZVESTIYA VUZOV PRIBOROSTROYENIYE in Russian No 5, 1976 pp 72-76
manuscript received 19 Nov 75

[Abstract] A study is made of the application of new systems methods of integration in modeling gyroscopic devices on a digital computer, allowing the modeling time to be reduced by many times. The systems methods are constructed on the basis of the identity

$$\begin{aligned}
 & z(t_{n+1}) - z(t_n) - \left[\int_0^H \phi^{-1}(t+\tau) d\tau + C \right] \phi(t_{n+1}) \frac{dz}{dt} \Big|_{t=t_n} + \\
 & + C \phi(t_n) \frac{dz}{dt} \Big|_{t=t_{n+1}} = \left[\int_0^\tau \varphi^{-1}(t_n+x) dx + C \right] \left[\varphi(t_n+\tau) \frac{d^2 z}{dt^2} - \right. \\
 & \left. - \frac{d\phi(t_n+\tau)}{d\tau} \frac{dz}{dt} \right]_{t=t_{n+1}-\tau} dt,
 \end{aligned}$$

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USSR

ZIMNITSKIY, V. A., KIRILLOVA, L. K., RAKITSKIY YU. V., SOL'NITSEV, R. I.,
IZVESTIYA VUZOV PRIBOROSTROYENIYE No 5, 1976 pp 72-76

and the system of equations

$$\frac{dz}{dt} = f(t, z), z(t_0) = z_0.$$

where $z(t)$ is the vector of m measurements; $f(t, z)$ is a vector function assigned in a closed area $\pi_{t,z}$, convex with respect to z , defined by the inequalities $|t| \leq T$, $|z_i(t) - z_i(t_0)| \leq R$, continuous in it and having the corresponding continuous partial derivatives with respect to all variables; H is the integration step for variable t ; $t_n = t_0 + nH$ (n is an integer); $\phi(t_{n+\tau}) = (\phi_{ij}(t_{n+\tau}))$ is a quadratic nonsingular matrix of order m , continuous and having a continuous first derivative with respect to τ ; τ is the integration variable ($0 \leq \tau \leq H$); C is a matrix of order m , independent of τ .

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USSR

UDC 629.78.017.2

SHITOV, I.N.

INVESTIGATING GYROSCOPIC SYSTEMS BY THE AVERAGING METHOD, GIVEN A RAPIDLY ROTATING PHASE

Dnepropetrovsk Nelineynaya Mekhanika [Nonlinear Mechanics, Collection of Works] in Russian, No 1, 1975 pp 93-96

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No 7 1976 Abstract No 7.41.88 (resume)]

[Text] The author discusses several questions on the dynamics of a bifilar suspension with elastic connections. He derives the motion equations for the plane and three-dimensional cases. On the basis of a solution of the nonlinear equations of motion describing the three-dimensional oscillations of a mechanical system, he determines the areas of parameter values in which it is possible for energy to be transferred from one type of oscillation to others. Figures 3; references 5.

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USSR

UDC 531.383

ARUTYUNOV, S. S. and KRIVOSHEYEV, S. V.

ON THE INFLUENCE OF INACCURACY IN INSTALLING GYROBLOCKS ON THE SYSTEMATIC DRIFT OF A THREE-AXIAL GYROSTABILIZER, CAUSED BY OSCILLATIONS OF THE BASE

Leningrad IZVESTIYA VUZ, PRIBOROSTROYENIYE in Russian, Vol 19, No 4, 1976 pp 70-75 manuscript received 11 Mar 75

[Abstract] The authors find expressions which permit allowing for the influence of inaccurate installation of gyroblocks on the systematic drift of a gyroplatform during its angular oscillations. They find that technological errors in the three-axial gyrostabilizer cause an additional component in the dynamic drift called technological dynamic drift. With determined oscillations in the platform the technical dynamic drift, with respect to ordinary dynamic drift, is a quantity of the first order of smallness. Unlike ordinary dynamic drift the authors find that technological dynamic drift contains components that are independent of the phase shift between the angles of oscillations of the platform. Figures 4; references 4: 4 Russian.

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USSR

UDC 531.383

OKON, I. M., Leningrad

ON THE SYSTEMATIC DRIFT OF AN INDICATOR GYROSTABILIZER DURING ROTATION OF A THREE-STAGE GYROSCOPE

Leningrad IZVESTIYA VUZ, PRIBOROSTROYENIYE in Russian, Vol 19, No 4, 1976 pp 80-84 manuscript received 25 Feb 75

[Abstract] In this article the author investigates the behavior of an indicator gyrostabilizer in which for automatic compensation of the drifts of the gyroscope he uses the method of forced rotation around the vector of the kinetic moment. He demonstrates that unlike gyrostabilizers without automatic compensation in the studied gyrostabilizer the moments which are constant in value along the axes of stabilization in the presence of viscous friction in the axes of the gyroscope support produce a systematic drift of the gyrostabilizer. Figures 2; references 3: 3 Russian.

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USSR

UDC 629.7.052-19

ZHESAN, A. V. and CHELPANOV, I. B., Leningrad Polytechnic Institute imeni M. I. Kalinnin

USE OF THE UPPER BOUND RESERVE FOR INCREASING RELIABILITY OF GYROSCOPIC NAVIGATIONAL SYSTEMS

Leningrad IZVESTIYA VUZ, PRIBOROSTROYENIYE in Russian Vol 19, No 6, 1976 pp 75-79 manuscript received 14 Jul 75

[Abstract] The authors demonstrate the possibility of the effective use of the upper bound in reserved gyroscopic navigational systems. Through the use of examples they show that any problem of failure indication can be solved with the upper bound reserve more simply than with the upper bound at the outputs. Figures 4; references 3: 3 Russian.

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KUZNETSOV, G. M., SERGEYEV, M. A. and EYMBKE, V. V., Leningrad Institute of Precision Mechanics and Optics

ON AZIMUTH DETERMINATION BY LASER GYROSCOPE

Leningrad IZVESTIYA VUZ, PRIBOROSTROYENIYE in Russian Vol 19, No 6, 1976 pp 70-74 manuscript received 8 Jan 76

[Abstract] The authors demonstrate the block diagram of a laser gyroscope used to determine the azimuth of the direction being oriented. They examine azimuth measurement errors caused by discreteness in information extraction and by systematic and random change in the number of pulses extracted from the laser gyroscope. They determine the time of observation at which the azimuth measurement error has the lowest value. It was found that the requirements in this scheme for random oscillations in the number of pulses extracted from the laser gyroscope are quite strict and the limitations imposed on the laser gyroscope drift are not substantial. Figures 2; references 4: 4 Russian.

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USSR

UDC 621.039.526.002.5:621.039.53

NEKRASOV, A. V., KARETNIKOV, G. V., BUGANOV, V. M., LOGVINOV, S. A. and TESTOV, I. N.

INVESTIGATION OF THE TEMPERATURE REGIME OF THE SURFACE OF HEAT EXCHANGE OF A STEAM GENERATOR TYPE BN-600 INSTALLATION

Obninsk SOSTOYANIYE I PERSPEKTIVY RABOT PO SOZDANIYU AES S REAKTORAMI NA BYSTRYKH NEYTRONAKH. T 2 [State and Prospects of Research on the Creation of an Atomic Energy Electric Power Plant With Fast-Neutron Reactors. Vol 2, Collection of Works] in Russian, 1975 pp 167-191

[From REFERATIVNYY ZHURNAL, TEPLONERGETIKA No 3 1976 Abstract No 3U68]

[Text] The authors present the results of an experimental investigation of the temperature regime in different zones of the evaporator of a type BN-600 installation. The investigation was conducted on various single- and multitube models under conditions of heating the tubes with sodium. They cite experimental data on the size of the convective heat exchange on the segment of deteriorated heat exchange, according to the values of the boundary steam contents in the zone of deteriorated heat exchange and according to the intensity of the pulsations in wall temperature

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USSR

NEKRASOV, A. V., KARETNIKOV, G. V., BUGANOV, V. M., LOGVINOV, S. A. and TESTOV, I. N., SOSTOYANIYE I PERSPEKTIVY RABOT PO SOZDANIYU AES S REAKTORAMI NA BYSTRYKH NEYTRONAKH. T 2, 1975 pp 167-191 [From REFERATIVNYY ZHURNAL, TEPLONERGETIKA No 3 1976 Abstract No 3U68]

accompanying the deterioration in heat exchange during boiling. They examine questions which have a considerable influence on the presentability of the results obtained in conducting the tests on models. They discuss the method of processing the data for the temperature regime of the surface of heat exchange using an electronic digital computer, which permits sharply decreasing the time consumption of the computations and increasing their accuracy. Figures 14; table 1; references 7.

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GRAKOVICH, L. P. and PYLILLO, L. YE.

TWO-COMPONENT HEAT TUBE

Minsk INTENSIFIK PROTSESSOV PERENOSA ENERGII I VESHCHESTVA V PORIST SREDAKH PRI NIZK TEMPERATURAKH [Intensification of the Processes of Energy and Material Transport in Porous Media at Low Temperatures, Collection of Works] in Russian 1975 pp 23-30

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 5 1976 Abstract No 5.34.166]

[Text] The authors give the results of an experimental investigation of heat tubes used as heat carriers for a mixture of various liquids. As a result of the experiments they determine the heat transport parameters of 2-component heat tubes with various combinations of components; they compared them with the parameters of 1-component tubes. The two-component heat tubes in their characteristics are not inferior to the one-component ones and may be successfully used for solving different problems of modern technology. Figures 6; references 5.

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GORLYSHKIN, V. T., MARIYCHUK, I. F.

DESIGN OF CANTILEVER THREE-LAYER SHAPED CENTRIFUGAL FAN BLADES

Leningrad ENERGMASHINOSTROYENIYE in Russian No. 5, 1976 pp 18-19

[Abstract] A study is made of the design of three-layer centrifugal fan blades of variable rigidity, loaded with centrifugal forces generated by their own mass. The study is done as applicable to the VTSC-32 main mine ventilator (drive wheel diameter 3.2 m, operating speed 600 rpm), the first fan of this type designed for main mine ventilation. When first started, the fan rapidly destroyed itself due to imbalance and blade failure (damaging its bearings, reducing transmission, bending the main shaft, etc.). This article presents a method of designing the blades of centrifugal fans as three-layer structures with orthotropic or isotropic filler of variable thickness, intended to withstand the perpendicular and tangential components of centrifugal force generated by their own mass, considering transverse shear.

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USSR

UDC 621.762.4

PAVLOV, V. A., Candidate of Technical Sciences and KUCHERENKO, V. G., Engineer, Zaporozhe Machine Building Institute imeni V. Ya. Chubor'

INSTALLATIONS FOR HYDROSTATIC PRESSING OF METAL POWDERS

Kiev TEKHNOLOGIYA I ORGANIZATSIYA PROIZVODSTVA in Russian No 2, 1976 pp 37-38 manuscript received 11 May 75

[Abstract] The devices described herein may be divided into four basic groups: one-step loading, two-step loading, with an intermediate multiplier unit and two-step loading with spaced hydrostats. Each group has its own specific uses described in the article. More than three years of operation demonstrates reliability of operation and ease of servicing. The plunger type installation has a productivity of 10-12 times that of a similar installation with a pumping-multiplier drive. The economic effect has been more than 20 rubles/linear meter of finished products. Figures 2.

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USSR/GDR

UDC 621.039.53:621.039.564

KOZLOV, F. A., KUZNETSOV, E. K., KOZUB, P. S., UL'MAN, F. A.,
RETS, T. and TESKE, K.

MONITORING OF OXYGEN AND HYDROGEN IN A SODIUM CIRCULATION LOOP BY
ELECTROMECHANICAL MEASURING METHODS

Obninsk SOSTOYANIYE I PERSPEKTIVY RABOT PO SOZDANIYU AES S REAK-
TORAMI NA BYSTRYKH NEYTRONAKH. T 2 [State and Prospects of Re-
search on Creating an Atomic Electric Power Plant With Fast-Neu-
tron Reactors. Vol 2, Collection of Works] in Russian, 1975 pp
280-308

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 3 1976 Abstract No
3U159 by Ye. A. Kremenevskaya]

[Text] This article concerns measurement methods and instruments
developed at the Rossendorf (GDR) Central Nuclear Research Institute.
The instruments were installed and tested on a sodium loop in the
FEI [R-and-D facility]. They verified the research on measuring
cells in various exploitational conditions of the sodium circula-
tion loop and compared the results obtained with the data from
other methods of measuring impurities. They give the scheme and

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USSR

KOZLOV, F. A., KUZNETSOV, E. K., KOZUB, P. S., UL'MAN, F. A.,
RETS, T. and TESKE, K., SOSTOYANIYE I PERSPEKTIVY RABOT PO SOZ-
DANIYU AES S REAKTORAMI NA BYSTRYKH NEYTRONAKH. T 2, 1975 pp 280-
308 [From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 3 1976 Abstract
No 3U159]

describe the experimental installation. They justify the choice
of working parameters of the measuring cells for oxygen (tempera-
ture of $350 \pm 5^{\circ}\text{C}$, consumption of sodium $0.2 \text{ m}^3/\text{h}$, of air 2-4 l/h,
rate of temperature increase of sodium $2^{\circ}\text{C}/\text{min}$), for which they
conducted experiments on finding the influence of the consumption
of sodium, consumption of air and sodium temperature on the indi-
cations of the cells. They evaluate the stability of the indica-
tions of the cells and the time of operation, the influence of
hydrogen on the activity of oxygen in sodium. The measuring cell
for oxygen and hydrogen operated in conjunction with a diffusion
nickel membrane with a surface of 1750 cm^2 , thickness of 1 mm.
The temperature of the membrane was 450°C , the consumption of the
carrier gas (argon) was 6 l/h. They give examples of monitoring
the working regime of the loop by electrochemical methods of meas-
urement. Figures 9; tables 6; references 13.

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USSR

UDC 53.082.32

ZHARINOV, V. G., SARBAYEV, V. K., RAKHIMZYANOV, R. A.

CHARACTERISTICS OF FULL AND STATIC PRESSURE PROBES FOR M-4.5 IN MOIST STEAM AT PRESSURES BELOW THE TRIPLE POINT

KHARAKTERISTIKI ZONDOV POLNOGO I STATICHESKOGO DAVLENIYA DLYA CHISLA M-4,5 VO VLAZHNOM PARE PRI DAVLENIYAKH, MEN'SHIKH DAVLENIYA V TROYNOY TOCHKE, 9 pages, Minsk, 1976

[Translated from REFERATIVNYY ZHURNAL 49. TURBOSTROYENIYE No. 6, 1976 Abstract No. 6.49.30DEP]

[Text] Experimental studies are presented of full and static pressure probes in a supersonic two-phase stream of water vapor at pressures of about 133 Pa. Based on visual observations, recommendations are developed for elimination of freezing of ice onto the probes. The influence of the length of the cylindrical portion of the probe and the conical angle of the tip on the indications of the static pressure probe are studied. The length of the cylindrical portion of the probe should be at least 15 diameters. Full and static pressure probes were studied for sensitivity

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USSR

ZHARINOV, V. G., SARBAYEV, V. K., RAKHIMZYANOV, R. A., KHARAKTERISTIKI ZONDOV POLNOGO I STATICHESKOGO DAVLENIYA DLYA CHISLA M-4,5 VO VLAZHNOM PARE PRI DAVLENIYAKH, MEN'SHIKH DAVLENIYA V TROYNOY TOCHKE, Minsk, 1976

to the skew angle of the stream, which was varied between 0 and 7°. Within this range of angles, the indications of the full pressure probe changed not over 2.5%. A static pressure probe is insensitive to stream skew at angles less than 5°.

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USSR

UDC 629.78.018.4

MALASHENKOV, S.P., and BALANIN, V.KH.

A DEVICE FOR INVESTIGATING THE KINETICS OF FATIGUE CRACKS FOR DIFFERENT CYCLIC LOADING FREQUENCIES

Kiev PROCHNOST', NADEZHNOST' I DOLGOVECHNOST' AVIATIONNYKH KONSTRUKTSIY [Strength, Reliability and Durability of Aviation Designs, Collection of Works] in Russian, No 1, 1975 pp 92-96

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No 7 1976 Abstract No 7.41.180 by T.A.Ye.]

[Text] Workers at the Kiev Institute of Civil Aviation Engineers have developed a device for testing samples of structural materials and structural elements that makes it possible to investigate the kinetics of fatigue cracks in the operational range of cyclic loading frequencies and amplitudes. The device makes it possible to test a batch of samples simultaneously, in accordance with the adopted loading method (transverse flexure in a single plane with a symmetrical cycle of loads), with an automated process for registering the kinetics of fatigue cracks during the testing process. It can also be

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USSR

MALASHENKOV, S.P., and BALANIN, V.KH., PROCHNOST', NADEZHNOST' I DOLGOVECHNOST' AVIATIONNYKH KONSTRUKTSIY, No 1, 1975 pp 92-96

used to study the effect of the cyclic loading frequency on the propagation of fatigue cracks in the frequency range 20-900 cps and the amplitude range 0.05-0.45 mm. Figures 3; references 4.

2/2

COPYRIGHT: All-Union Institute of Scientific and Technical Information, Moscow, 1976

USSR

UDC 629.7.036.3:531.7

KOMYAK, N. I., KURBATOV, V. M., PELIKS, YE.A. and SINDALOVSKIY, YE. I.

IMPULSE X-RAY SET-UP

Moscow VSES NAUCH-TEKHN KONF. SOVREM SOSTOYANIYE I PERSPEKTIVY VYSOKOSKOROSTN FOTOGR I KINEMATOGR I METROL BYSTROPROTEKAYUSHCHIKH PROTSESSOV. TEZISY DOKL [All-Union Scientific and Technical Conference. State of the Art and Prospects for High-Speed Photography and Moving Picture Photography and the Metrology of Rapidly Occuring Processes. Texts of Reports, Collection of Works] in Russian, 1975 p 119

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 4 1976 Abstract No 4.34.100]

[Text] The set-up consists of six pulse sources of x-radiation and a synchronization block which ensures triggering of all sources at the necessary moment of time. Each x-radiator includes an x-ray tube with explosive emission of electrons and a compact source of high voltage on the base of a resonance transformer and

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USSR

KOMYAK, N. I., KURBATOV, V. M., PELIKS, YE. A. and SINDALOVSKIY, YU. I., VSES NAUCH-TEKHN KONF. SOVREM SOSTOYANIYE I PERSPEKTIVY VYSOKOSKOROSTN FOTOGR I KINEMATOGR I METROL BYSTROPROTEKAYUSHCHIKH PROTSESSOV. TEZISY DOKL, 1975 p 119

discharge-accentuator. The set-up ensures transmission for 1 pulse of steel samples with a thickness up to 10 mm with a focal distance up to 1 m. The duration of the pulse of radiation here is 30-40 ns. The delay time between pulses is regulated discretely from 10 microseconds to 6 ms with stages every 10 microseconds. The set-up is designed for operation under field conditions at a temperature of the surrounding atmosphere from -30 to 50° C. The mass of each radiator does not exceed 60 kg.

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USSR

UDC 539.165.074.5

YAKSHIN, V. V., VOLODIN, S. N., KUMIROV, A. I., TERENT'YEV, B. M., CHEREVA-TENKO, G. A.

PROCESSING OF SPECTRAL DISTRIBUTIONS OF BETA-SOURCE EMISSIONS, OBTAINED WITH THE AID OF A SEMICONDUCTOR DETECTOR

Moscow VOPROSY ATOMNOY NAUKI I TEKHNIKI. RADIATIONNAYA TEKHNIKA [Problems of Nuclear Science and Engineering. Radiation Technology, Collection of Works] in Russian, Atomizdat, No 12, 1975 pp 61-72

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 32, 1976 Abstract No 5.32.1713]

[Text] Studies were carried out on the theoretical and experimental aspects of determining the sensitivity of a semiconductor detector to electron emission within an energy range of 0.10-2.00 MeV. Knowledge of the sensitivity function is necessary for processing continuous and complex β -spectrograms

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USSR

YAKSHIN, V. V., VOLODIN, S. N., KUMIROV, A. I., TERENT'YEV, B. M., CHEREVA-TENKO, G. A., VOPROSY ATOMNOY NAUKI I TEKHNIKI. RADIATIONNAYA TEKHNIKA [Problems of Nuclear Science and Engineering. Radiation Technology, Collection of Works] No 12, 1975 pp 61-72

in order to obtain the true emission spectrum. The semiconductor detector used in the study was Si (Li) detector type DDS with a sensitive zone 2 mm in thickness and 12 mm in diameter. The experimental part of the study was carried out on the apparatus, which made it possible to obtain quasi-monoenergetic collimated electron beams from various radioisotopic β -sources. The experimentally obtained sensitivity function is represented as a right matrix measuring 18x18 and with a "pitch" of 100 keV. Illustrations 4; tables 1; references 5.

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USSR

UDC 543.275.1.08

BEGUNOV, A. A., SHUSTOVA, V. N.

CONDENSING-GRAVIMETRIC APPARATUS DEVELOPED BY THE ALL-UNION SCIENTIFIC RE-
SEARCH INSTITUTE OF METROLOGY

Unknown TRUDY METROLOGICHESKIH INSTITUTOV SSSR. VNII METROLOGII in Russian
No 161 (221), 1975 pp 39-45

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 32, 1976
Abstract No 5.32.1242 by V. L. M.-B.]

[Text] The schematic gas diagram, digrams of the condensation and sorption
cells, and a structural description are given for a high-precision condensing-
gravimetric apparatus designed to determine water vapor content in gases.
The apparatus operates on the condensation-gravimetric system of separating
wet gas into water vapor and dry gas, and then measuring the weight of each.
The range for the established and measured values of moisture content (molar

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USSR

BEGUNOV, A. A., SHUSTOVA, V. N., TRUDY METROLOGICHESKIH INSTITUTOV SSSR.
VNII METROLOGII No 161 (221), 1975 pp 39-45

fractions) is from 0.003 to 0.6. Relative measurement error given a con-
fidence coefficient of 0.997 percent is 0.16-0.06; working temperature range,
293-523°K; effective pressure range 101-450 kPa _____; flow
rate of control gas mixture, up to 1 m³/hr; duration of experiment, 0.5-5 hr.
An analysis is carried out of random and systematic measurement **error**.
Illustrations 3; references 4.

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USSR

UDC 541.8:621.36.082

RESHETNIK, V. Ya., KUCHERENKO, A. M., SHAPOVALOV, V. G., SYROYED, A. P.

MEASURING INFORMATION SYSTEM FOR AUTOMATIC COMPOSITION CONTROL OF MULTI-COMPONENT SOLUTIONS

Kishinev IZMERITEL'NYYE INFORMATSIONNYYE SISTEMY [Measuring Information Systems, Collection of Works] in Russian Vol 1, 1975 pp 162-163

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 32, 1976 Abstarct No 5.32.1086 by V. S. K.]

[Text] The developed measuring information system (IIS) consists of an integrated sensing element for supersonic velocity, electrical conductivity and temperature of the controlled solution, transducers for converting signals from the sensing element into direct current of 0-5 mA and a general-purpose computer for calculating the unknown component concentrations of the analyzed mixture. During industrial testing of the IIS at the Pikalevskiy

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USSR

RESHETNIK, V. Ya., KUCHERENKO, A. M., SHAPOVALOV, V. G., SYROYED, A. P., IZMERITEL'NYYE INFORMATSIONNYYE SISTEMY [Measuring information Systems, Collection of Works] Vol 1, 1975 pp 162-163

Alumina Combine, the root-mean-square deviations of the concentration measurement results from the results of chemical analyses equalled ± 1.8 g/liter for alkali and ± 2.5 g/liter for aluminum oxide within the 20 g/liter measurement range.

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USSR

ALKHIMOV, A. P., PAPYRIN, A. N., PREDEIN, A. L.

USE OF A HIGH-SPEED CONFOCAL SPECTROMETER IN A DOPPLER VELOCITY MEASURING DEVICE

AEROFIZ. ISSLEDOVANIYA. VYP. 5 in Russian, Novosibirsk 1975, pp 265-266

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No. 7B1271 by A. I. Kharitonov]

[Text] A reports is presented of studies involved in the creation of the LDIS doppler speed meter, intended to study the effect of the velocity "delay" of particles in supersonic two-phase streams. The source of radiation was an LG-159 laser. The doppler frequency shift was recorded by a scanning confocal Fabry-Perot interferometer based on a piezoceramic (area of dispersion 750 MHz, hardware half width about 10 MHz, scanning frequency 50 Hz), providing for measurement in the velocity range $10-10^3$ m/sec. The device was studied using a stationary supersonic two-phase stream. Both absolute and relative velocities of motion of various particles were measured (particles of smoke measuring less than $1 \mu\text{m}$ and organic glass),

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USSR

ALKHIMOV, A. P., PAPYRIN, A. N., PREDEIN, A. L., AEROFIZ. ISSLEDOVANIYA. VYP. 5 1975, pp 265-266

simultaneously introduced to the stream. When a set of various particles is available, the particle "delay" effect can be measured over a broad range of Reynolds and Mach numbers. The speed of the confocal spectrometer (line circuit writing time $\tau < 10^{-3}$ sec) allows it to be used to study unstable processes.

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USSR

UDC 621.375.826

VOLKOV, V. I., ONIN, V. V., KHANOV, V. A.

STUDY OF THE DESIGN OF A HELIUM-NEON LASER INTENDED FOR INTERFERENCE MEASUREMENTS

Novosibirsk AVTOMETRIYA in Russian No. 3, 1976 pp 73-76 manuscript received 2 Dec 75

[Abstract] Results are presented from a study of the simplest design of helium-neon laser, the LG-32, stabilized by means of a Lamb gap and intended for use in laser interferometers. The laser consists of an invar tube with a longitudinal slot which carries the active element. The active element is a two-electrode DC gas-discharge tube with a cold cathode, filled with a mixture of helium and neon. The anode used is a gas absorber. The optical resonator consists of flat and spherical mirrors installed on piezoceramic mountings. The mountings are carried on flanges which are attached by means of intermediate elastic rings to the ends of the tube. The distance between mirrors is 150 mm, the length of the active sector of the discharge tube is 100 mm, the diameter of the capillary tube is 1 mm. These lasers, it is concluded, are not suitable

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USSR

VOLKOV, V. I., ONIN, V. V., KHANOV, V. A., AVTOMETRIYA No. 3, 1976 pp 73-76

for practical use in interferometers, since they are critical to mirror adjustment, operate over a narrow range of temperature variation, require long periods of time to prepare for operation and have low vibration resistance.

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USSR

UDC 631.7:681.3.54

VEDERNIKOV, V. M., PETRASHEVICH, L. A., TARASOV, G. G., KHANOV, V. A.,
SHCHERBACHENKO, A. M.

MEASURING SYSTEMS WITH LASER SENSORS BASED ON "ELEKTRONIKA-70" PROGRAMMABLE
KEYBOARD ELECTRONIC COMPUTERS

Novosibirsk AVTOMETRIYA in Russian No. 3, 1976 pp 47-53 manuscript
received 27 Oct 75

[Abstract] A significant class of applied problems can be solved in measurement systems using keyboard electronic computers. Simple programming languages, the availability of standard input-output devices allow rather simple and inexpensive automated measurement systems to be built on their basis. However, the best domestic keyboard computer, the Elektronika-70, has no electronic data input channel; therefore, this channel must be developed before such machines can be used in automated measurement systems. This article analyzes the general structural plan of a measurement system with laser sensors based on the Elektronika-70 computer, presents the schematic diagrams of the keyboard computer data input system and the measurement device interface. Systems now in practical use for measurement of linear displacements, at the acceleration of the force of gravity, angles

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USSR

VEDERNIKOV, V. M., PETRASHEVICH, L. A., TARASOV, G. G., KHANOV, V. A.,
SHCHERBACHENKO, A. M., AVTOMETRIYA No. 3, 1976 pp 47-53

of rotation and the index of refraction of the air are described, and estimates of the instability of the laser radiation frequency are presented.

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USSR

KUZIVANOV, V. A. and NAUMENKO-BONDARENKO, I. I., Order of Lenin
Institute of Earth Physics imeni O. Yu. Shmidt

DEVICE FOR MEASURING THE FORCE OF GRAVITY IN MOTION

Moscow USSR PATENT NO (11) 519667 (21) 2059788/26-25 (22) 09.09.
74 2(51) G 01 V 7/01 (53) 550.831 (72)

[From OTKRYTIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE
ZNAKI No 24 1976 p 127]

[Text] The device, containing a sensing element with a converter of mechanical shifts into an electric signal and a registering device, is distinguished by the fact that for the purpose of increasing the measurement accuracy, there are introduced into it a signal divider, a block of instantaneous values of the readings from the sensing element, a block of comparison of the instantaneous and integral values of the readings from the sensing element; the output of the converter of the sensing element is connected

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USSR

KUZIVANOV, V. A. and NAUMENKO-BONDARENKO, I. I., USSR PATENT NO
519667 [From OTKRYTIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY,
TOVARNYYE ZNAKI No 24 1976 p 127]

with the signal divider, to the outputs of which are connected in parallel the blocks of instantaneous and integral values of the readings from the sensing element, the outputs of which being connected with the comparison block; the output of the comparison block and the output of the converter of the sensing element are connected to the registering device.

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USSR

VOLKOV, I. I., MOTOV, V. V. and AGEYEV, A. S.

DEVICE FOR DETERMINING THE COEFFICIENTS OF STATISTICAL LINEARIZATION OF NONLINEAR DYNAMIC OBJECTS

Moscow USSR PATENT NO (11) 519687 (21) 2113645/18-24 (22) 14.03.75
2(51) G 05 B 23/02 (53) 681.333:519.2 (72)

[From OTKRYITIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE
ZNAKI No 24 1976 p 133]

[Text] The device, containing a registration block, a first multiplication block, a first averaging block, a matching block, a second multiplication block fastened by the first input to the first input of the device, and by the output -- to the first input of the subtraction block, the second input of which is connected to the second input of the device, and the output -- connected with the input of the second averaging block, is distinguished by the fact that for the purpose of increasing the accuracy, the device contains a supplementary subtraction block, whose inputs are

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USSR

VOLKOV, I. I., MOTOV, V. V. and AGEYEV, A. S., USSR PATENT NO 519-687 [From OTKRYITIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI No 24 1976 p 133]

connected, respectively, with the outputs of the second averaging block and subtraction block, and the output is connected to the first input of the first multiplication block, the second input of which is connected with the first input of the device, and the output through sequentially connected first averaging block and matching block is connected to the second input of the second multiplication block, the two inputs of the registration block are connected respectively with the outputs of the second averaging block and the matching block.

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USSR

UDC 620 179.152.1:621.391.83.2

SHPAGIN, A. P., KUCHER, G. A.

ESTIMATE OF THE DEGREE OF DETERIORATION OF THE SIGNAL-TO-NOISE RATIO BY MONO-CRYSTAL SCREENS

Unknown IZVESTIYA TOMSKOGO POLITEKHNICHESKOGO INSTITUTA in Russian No 248, 1975 pp 11-14

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 32, 1976 Abstract No 5.32.267 by P. N. A.]

[Text] Results are presented from an estimate of the degree of deterioration of the signal-to-noise ratio by monocrystal screens 0.5 cm in thickness. The energy efficiency of monocrystal screens 0.5 cm thick made from CdS, ZnS, CsI (Tl), NaI (Tl), CdWO₄ and CaWO₄ was investigated. Energy efficiency is not always conclusive when estimating the quality of screens; sometimes the screens must be compared by the degree of deterioration of the signal-to-noise ratio. A change in the signal-to-noise ratio is examined in screens

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USSR

SHPAGIN, A. F., KUCHER, G. A., IZVESTIYA TOMSKOGO POLITEKHNICHESKOGO INSTITUTA No 248, 1975 pp 11-14

0.5 cm thick made from the above-mentioned materials. Illustrations 2; references 2.

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USSR

UDC 620.179.152.2:061.6

VOROB'YEV, V. A., GAVLAKOV, Yu. D., KUNITSYN, G. A., SHUMIKHIN, V. F., YARO-SLAVTSEV, V. D.

MOBILE BETATRON LABORATORY

Unknown IZVESTIYA TOMSKOGO POLITEKHNICHESKOGO INSTITUTA in Russian No 248, 1975 pp 43-46

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 32, 1976 Abstract No 5.32.279 by P. N. A.]

[Text] The All-Union Scientific Research Institute of Electron Introscopy developed three versions of mobile betatron laboratories, which permit product control under nonstationary conditions. The laboratory equipment is installed in the covered body of a motor vehicle, and includes a betatron electromagnet, power supply, a control desk, as well as photolaboratory equipment. Laboratory versions PBL-1, PBL-2 and PBL-2A differ from each other in the type of betatron used, the equipment assembly for film proces-

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USSR

VOROB'YEV, V. A., GAVLAKOV, Yu. D., KUNITSYN, G. A., SHUMIKHIN, V. F., YARO-SLAVTSEV, V. D., IZVESTIYA TOMSKOGO POLITEKHNICHESKOGO INSTITUTA No 248, 1975 pp 43-46

sing and, accordingly, in the resources for controlling film thickness, exposure and the speed of film processing. A three-year testing period has been completed for mobile defectoscopic betatron laboratories. Tables 1; references 2.

2/2

USSR

UDC 534.2.08:621.833.531.717(088.8)

TAYTS, B. A., TSEYTLIN, S. I., SHUMILIN, V. V., Moscow Institute of Electronic Machine building

SEISMIC SENSOR FOR CONTROLLING KINEMATIC CHAIN ERROR

Unknown AVTORSKOYE SVIDETEL'STVO SSSR in Russian class G 01 b 7/30, No 462984, claimed 2 Oct 72, published 15 May 75

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 32, 1976 Abstract No 5.32.468P]

[Text] A seismic sensor is proposed for controlling kinematic chain error. The sensor is composed of the following elements: an inertial rotor; a cross-shaped hinge made of flat springs on which the rotor is suspended; a slip ring, mounted so as to permit rotation about the rotor axis; a damping system for the latter; a transformer-type transducer to issue an electronic signal proportional to rotor rotation, featuring an open core with lateral arms;

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USSR

TAYTS, B. A., TSEYTLIN, S. I., SHUMILIN, V. V., AVTORSKOE SVIDETEL'STVO SSSR class G 01 b 7/30, No 462984, claimed 2 Oct 72, published 15 May 75

electromagnetic arresters with anchors to secure the rotor in the off position. In order to control the kinematic chain error in objects of varying type size, the lateral arms of the core are chamfered, the transformers are installed parallel to the rotor and turned by magnetic circuits toward the rotation axis of the rotor, and each arrester is executed in the form of an electromagnet. The anchor of the latter is suspended on a flat spring and engages the rotor during immobilization.

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USSR

UDC 534.647:531.768.087.92.096

LEVAKOV, Ye. I., KLOCHKO, V. A., GRECHINSKIY, D. A., RYGALIN, V. G., SLOBODNIK, E. B.

STUDY OF VIBRATION ACCELERATION STRING MEASURING TRANSDUCERS AT ELEVATED TEMPERATURES

Unknown TRUDY NAUCHNO-ISSLEDOVATEL'SKOGO I KONSTRUKTORSKOGO INSTITUTA ISPITATEL'NYKH MASHIN, PRIBOROV I SREDSTV IZMERENIYA MASS in Russian No 6, 1974 pp 44-49

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 32, 1976 Abstract No 5.32.656 by P. N. A.]

[Text] Results are presented of a theoretical and experimental study carried out on the operation of string transducers under alternating force, as is a description of the manufactured vibration acceleration string transducer (SPV). The SPV measures 8x14x21 mm and weighs 9 g. The block diagram of the

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USSR

LEVAKOV, Ye. I., KLOCHKO, V. A., GRECHINSKIY, D. A., RYGALIN, V. G., SLOBODNIK, E. V., TRUDY NAUCHNO-ISSLEDOVATEL'SKOGO I KONSTRUKTORSKOGO INSTITUTA ISPITATEL'NYKH MASHIN, PRIBOROV I SREDSTV IZMERENIYA MASS No 6, 1974 pp 44-49

apparatus operating with the SPV includes a string excitation generator, a clipper, a direct-current amplifier, a low-frequency filter, a matching device and a recorder. The temperature range for the SPV is calculated to reach 600-700°C. The apparatus has the following characteristics: frequency range 0-1100 Hz; amplitude range 0-100 m/c²; nonlinearity of frequency characteristic ± 5 percent; temperature error 1.75 percent for 100°C. Illustrations 6; references 6.

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USSR

UDC 541.132.3(083.7)

VRUBLEVSKAYA, L. V., KOLLEROV, D. K., PISKUNOV, L. P.

STANDARD APPARATUS FOR pH UNIT CONVERSION

Unknown TRUDY METROLOGICHESKIH INSTITUTOV SSSR. VNII METROLOGII in Russian No 161 (221), 1975 pp 5-10

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 32, 1976 Abstract No 5.32.1054 by V. L. M.-B.]

[Text] A description is given of a newly constructed standard apparatus for effecting precise pH measurements of solutions. The apparatus consists of a measurement section, containing measuring devices, a hydrogen collection and purification unit, a unit for preliminary solution saturation with hydrogen, a panel with an electrolyzer power circuit, switches and a recording millivoltmeter, a constant-temperature water thermostat type TV-ZM, developed by the All-Union Scientific Research Institute of Metrology, as well as an

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USSR

VRUBLEVSKAYA, L. V., KOLLEROV, D. K., PISKUNOV, L. P., TRUDY METROLOGICHESKIH INSTITUTOV SSSR. VNII METROLOGII No 161 (221), 1975 pp 5-10

electrolytic cell with electrodes. The results of apparatus testing revealed the following. The thermostat section ensures constant temperature in the cells with an accuracy of up to 0.02°C for the temperature range $10-60^{\circ}\text{C}$, and $0.03-0.04^{\circ}\text{C}$ accuracy for temperatures of $0-10^{\circ}\text{C}$ and $60-95^{\circ}\text{C}$. Temperature measurement errors do not exceed $\pm 0.01^{\circ}\text{C}$. The construction of the electrolytic cell permits measurements with a hydrogen electrode along the entire temperature range. Measuring element equilibrium is achieved in 3-4 hr from the moment of saturation of the hydrogen electrode. The emf of the hydrogen-silver chloride element is measured with an error of up to 0.02 mV. Illustrations 3; references 9.

2/2

USSR

UDC 629.7.036.3.001.4

YERMOLINA, N.P., and SAVVIN, D.S.

EXPERIMENTAL DEVICE FOR INVESTIGATING TURBINES WITH A ROTARY NOZZLE APPARATUS

Moscow TRUDY MOSKOVSKOGO AVIATIONNOGO INSTITUTA [Works of the Moscow Aviation Institute] in Russian No 329, 1975 pp 52-57

[From REFERATIVNYY ZHURNAL, AVIATIONNYE I RAKETNYE DVIGATELI No 2 1976 Abstract No 2.34.105]

[Text] The authors describe an experimental device for investigating the characteristics of single- and double-stage turbines, with one of the stages having a rotary nozzle apparatus, over a wide range of changes in turbine operating conditions. The basic elements of the device are: the turbine being tested; a hydraulic brake; an intake manifold; an ejector-exhaust fan. The required degree of expansion in the turbine is created by a supersonic ejector operating on "average pressure" air from a common compressor house. For a high-head jet pressure $p_k = 3$ atm (abs.), the ejector provides a degree of expansion in the turbine $\pi_T = 1.6$ (the pressure at the turbine's intake is atmospheric, for all practical purposes) for an air flow rate through the turbine of $G_b = 0.6$ kg/sec. Figures 3.

1/1

USSR

UDC 531.717.81.082.54:531.711

VALUYEVA, N. N., SOLODUKHO, F. M., KOVAL', V. A.

DEVICE FOR MEASURING ABSOLUTE SURFACE ROUGHNESS

Unknown TRUDY METROLOGICHESKIH INSTITUTOV SSSR. VNII METROLOGICHESKOY SLUZHBY in Russian No 179 (239), 1975 pp 60-65

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 32, 1976 Abstract No 5.32.471 by P. N. A.]

[Text] Polished and finished surface, e.g., working surfaces of end gauge length, have a depth of irregularity on the order of 0.063 - 0.032 μm and pitch 0.6 - 0.3 μm . The results of studies carried out on a design model of a two-ray microinterferometer for measuring the roughness of these surfaces are presented. High resolution was achieved for the model by using an immersion objective with an aperture of $A = 1.25$. Interferograms of the measured surfaces are given. Illustrations 3; references 2; tables 1.

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USSR

UDC 536.521.082.52

NOVIKOV, V. G., KOVAL', B. L.

PHOTOELECTRIC PYROMETER FOR TEMPERATURE MEASUREMENT IN THE BUILDING MATERIALS INDUSTRY

Unknown STEKLO. TRUDY INSTITUTA STEKLA in Russian No 1 (148), 1975 pp 108-110

[From REFERATIVNYY ZHURNAL, METROLOGIYA I IZMERITEL'NAYA TEKHNIKA No 32, 1976 Abstract No 5.32.996 by P. N. A.]

[Text] The Gusevskiy branch of the State Scientific Research Institute of Glass has developed a photoelectric pyrometer for measuring temperatures within the 150-1800°C range. The measurable temperature interval is divided into four ranges. This device is a partial radiation pyrometer, featuring a lead-sulfur photoresistor type FSA-1 as a sensing element. The reproducibility of pyrometric readings is 1-3°C along the entire scale.

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USSR

UDC 621.891.531:43

DEMKIN, N. B., ALEKSEYEV, V. A., LEMBERSKIY, V. B., SOKOLOV, V. I.,
Kalinin Polytechnical Institute

FLOW OF GAS THROUGH THE JUNCTION OF CONTACTING SURFACES

Moscow IZVESTIYA VUZOV MASHINOSTROYENIYE in Russian No. 6, 1976 pp 40-44
manuscript received 28 Feb 75

[Abstract] Based on known statements from the theory of contact of rough surfaces and filtration through porous bodies, a formula is produced allowing the leakage of gas through two contacting surfaces which are wavy to be estimated. The experimental installation is described. Results are presented from experiments on determination of the flow rate of air through a joint formed between a rough surface and a smooth surface. The experimental data agree satisfactorily with the theoretical dependence suggested.

1/1

USSR

SHPIN'KOV, N. I. (71), Moscow Order of Lenin and Order of Labor
of the Red Banner State University imeni M. V. Lomonosov

VIBRATION MAGNETOMETER

Moscow USSR PATENT NO (11) 519662 2085412/26-21 (22) 20.12.74 2 (51)
G 01 R 33/12 (53) 621.317.4

[From OTKRYTIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE
ZNAKI No 24 1976 p 126]

[Text] The magnetometer, containing a magnetic field source, two
receiving coils, a measuring circuit connected to the coils and a
vibrating rod on which the test sample is placed, is distinguished
by the fact that for the purpose of increasing the measurement ac-
curacy it is equipped with a rotating bench with a dial whose axis
of rotation matches the longitudinal axis of the rod, the receiv-
ing coils being placed on the plane of the rotating bench.

1/1

USSR

UDC 621.165-52:621.515.5

SAVCHENKO, Z. A., BEZUSYAK, YU. L., SERDYUK, A. N.

SYSTEM FOR AUTOMATED TESTING OF TECHNOLOGICAL PARAMETERS OF THE STEAM
TURBINE OF A LARGE TONNAGE AMMONIUM PRODUCTION COMPRESSOR

SISTEMY I SREDSTVA AVTOMATIZ, UPR. TURBOMASH. KOMPLEKSAMI in Russian
Kiev Tekhnika Press 1975, pp 98-104

[Translated from REFERATIVNYY ZHURNAL 49. TURBOSTROYENIYE No. 1, 1976
Abstract No. 1.49.75]

[Text] A study is made of automatic systems for local and centralized
testing of the basic parameters of the steam turbine of a centrifugal
compressor from a large tonnage ammonia producer. The schematic diagrams
of the equipment for automatic testing of technological parameters are
presented. 2 figures.

1/1

USSR

UDC 535.43.07:621.378.32

KOLYADIN, A. I., MUKHINA, T. I.

A NEPHELOMETER FOR INVESTIGATION OF SCATTERING OF RADIATION IN OPTICAL MATERIALS

Leningrad OPTIKO MEKHANICHESKAYA PROMYSHLENNOST' in Russian No. 6, 1976
pp 32-37 manuscript received 7 Aug 75

[Abstract] An instrument for measurement of the scattering of radiation in optical materials in the 0.8-3.5 μm spectral range at temperatures of 20-600 C in the forward direction in a cone with a tip angle of 9° is described. A formula is produced for determination of the scattering factor, characteristic curves of the spectral dependence of the scattering factor of optical ceramics KO-1, KO-2 and KO-5 are presented. A numerical estimate is given of the background created by a part made of optical ceramic in the image plane. The estimate is made on the assumption that the scattering plate is illuminated only by light from the object imaged. The background level may increase by many times if there is a powerful source located, even if not in the field of vision, at an angular distance from the axis such that its radiation strikes the scattering part.

1/1

USSR

UDC 621.374.387

YEDEL'KIN, V. I., IVANOV, V. I., MALEVICH, I. A., POSTOYANOV, YU. I.,
Scientific Research Institute for Applied Physics Problems of Byelorussian State University

A SPECTROMETRIC TIME-TO-CODE CONVERTER WITH AUTOMATIC COMPENSATION OF NON-LINEARITY

Leningrad IZVESTIYA VUZOV PRIBOROSTROYENIYE in Russian No. 5, 1976 pp 19-24
manuscript received 17 Oct 75

[Abstract] A time-amplitude-code is described, based on the principle of start-stop conversion of a time interval to amplitude with simultaneous nonlinear charging of the memory condensor of an analog-code converter and subsequent measurement of the time interval of discharge of the memory condensor. In order to reduce the error in coding small amplitudes, a two-channel principle of compensation of nonlinearity is used, based on adjustment of the threshold of sensitivity of the discharge current generator of the main channel of the converter. The dynamic range of input signals $D = 10-500$ ns is handled with a time resolution of $1 \cdot 10^{-10}$ s, in the 10-1000 ns range, $\Delta t = 3 \cdot 10^{-10}$ ns with differential conversion nonlinearity 1.2%.

POLAND

BOENIGK, ZBIGNIEW, Agricultural-Technical Academy, Department of Geodesy, Olsztyn, and OSZCZAK, STANISLAW, Observation Station of Artificial Earth Satellites No 1151, Olsztyn

CODE THEODOLITE WITH AUTOMATIC RECORDING OF CIRCLE READINGS

Warsaw PRZEGLAD GEODEZYJNY in Polish Vol 48, No 2, Feb 76 pp 44-46

[Abstract] In the beginning of 1975 at the Observation Station of Artificial Earth Satellites No 1151 at Olsztyn, a code theodolite was installed permitting the automatic recording, on a punched tape, of directions being measured. The automatic recording of the readings of horizontal and vertical circles made it possible to considerably increase the number of observations and improve the accuracy of the determination of the satellite's position. The instrument is equipped with a double telescope with a field of vision of 7° and magnification of about $10\times$. Instead of classical circles, horizontal and vertical with vernier reading, electrostatic angle converters were installed permitting both numeric readings of directions and their automatic recording on a punched tape. The principle of operation of the angle converter is described in the patent application 1/2

POLAND

BOENIGK, ZBIGNIEW, and OSZCZAK, STANISLAW, PRZEGLAD GEODEZYJNY Vol 48, No 2, Feb 76 pp 44-46

of Z. Boenigk. The observation may be performed by two methods, viz., within the framework of the system, and with reference to chosen star bearings. The mean error of a single observation is $1'$. Figures 5; references 5: including 4 Polish (of which 2 are Russian language) and 1 Russian.

USSR

UDC 621.4

KURSHAKOV, A. V., SALTANOV, G. A., NIKOL'SKIY, A. I.

OPTICAL PROBE FOR DETERMINATION OF THE STRUCTURE OF A TWO-PHASE STREAM IN THE FLOW-THROUGH PORTIONS OF TURBINES

Moscow TR MOSK ENERG. IN-TA in Russian 1975, No. 273 pp 108-110

[Translated from REFERATIVNYY ZHURNAL 49. TURBOSTROYENIYE No. 1, 1976 Abstract No. 1.49.71 by L. P. A.]

[Text] A description is made of the design of an optical probe allowing small-angle method measurement of the dimensions of drops within limits of 5 to 100 μm . The light source for the probe is a type LG-56 laser, yielding a beam of monochromatic radiation with a wavelength $\lambda=0.6328\mu\text{m}$. The laser beam, transmitted by means of a mirror through a pipe 10 x 2 mm in diameter, is rotated by a prism by 180° , stopped down to a diameter of 0.8 mm and fed into the study volume. The indicator of scattering is traversed by a scanning device within limits of $\gamma \leq 3^\circ$. Within the receiving tube, diameter 38 x 2 mm is a long-focus lens, converting the beam of

1/2

USSR

KURSHAKOV, A. V., SALTANOV, G. A., NIKOL'SKIY, A. I., TR MOSK ENERG. IN-TA 1975, No. 273 pp 108-110

scattered light to a plane-parallel beam. At the focal point of this lens is a receiving diaphragm 0.8 mm in diameter connected to an FEU-51 photomultiplier equipped with interchangeable light filters and moved by means of a microcoordinate stage. The body of the multiplier is made with a water jacket for cooling. In order to prevent penetration of the probe by a film or individual droplets, the probe is constantly blown through with gas at excess pressure through all channels over the path of transmission of the light beam, particularly using a special channel over the prism in the rotating head of the probe. All internal surfaces of the probe are covered with a black light-scattering fabric.

2/2

USSR

BELINSKIY, B. A., KAPLAN, E. N. and SHATALOV, V. K.

DEVICE FOR LINEAR SPATIAL FILTRATION OF TWO-DIMENSIONAL OPTICAL SIGNALS

Moscow USSR PATENT NO (11) 519672 (21) 2041322/26-25 (22) 04.07.74 2 (51) G 02 F 1/11; G 06 G 9/00 (53) 621.372.54.029.67 (72)

[From OTKRYTIYA, IZOBRETENIYA, PROMYSHLENNYYE OBRAZTSY, TOVARNYYE ZNAKI No 24 1976 p 128]

[Text] The device, containing a laser, a collimator, a transparency, lens, ultrasonic light modulator and output lens placed in sequence on the same optical axis, is distinguished by the fact that for the purpose of simplifying the formation of the assigned functions of transmission, the ultrasonic light modulator is made multichannel with a two-dimensional multichannel characteristic in the plane of the modulator and a spectrum multiplier is installed between the modulator and the objective lens.

1/1

USSR

MELKONYAN, K. M., All Union Scientific Research Institute for Electric Drives

INCREASING THE ACCURACY OF TRACKING OF THE CONTROL SYSTEM OF THE DOME OF THE ATZ-2.6-m TELESCOPE BY USING AN AUTOMATIC AC BRIDGE IN THE PRECISE READING SYSTEM

Yerevan IZVESTIYA AN ARMYANSKOY SSR in Russian No. 1, 1976 pp 24-29
manuscript received 10 May 75

[Abstract] In order to allow precise movements of the dome over the ATZ-2.6 m telescope, a two-readout tracking system was developed in which the precise readout system is an automatic AC bridge. The sensor used is a differential transformer sensor which converts the control influence to the combined impedance, equal to the active and reactive components of the impedance of the sensor. A schematic diagram of the control system of the dome is presented. By using the precise system for angles of less than 6°, the tracking system is made to operate smoothly, without periodic motion.

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USSR

UDC 535.88

TOROCHKOV, V. YU., ZHILKIN, A. M., USOV, V. S., KRASHCHIN, M. D.,
SHERESHEV, A. B.

PHOTOELECTRIC AUTOCOLLIMATOR WITH SMALL TIME CONSTANT

Leningrad OPTIKO MEKHANICHESKAYA PROMYSHLENNOST' in Russian No. 5, 1976
pp 26-28 manuscript received 8 Dec 75

[Abstract] A new high-speed photoelectric autocollimator is described, diagrammed and its operating principle presented. Mathematical dependences are presented which demonstrate its operation. The technical characteristics of the mock-up of the autocollimator are: focal length of objective -- about 410 mm; diameter of objective -- 45 mm; generator frequency -- 800 Hz; photoreceptor type FD-7K; dimensions -- 460 x 120 x 90 mm; weight -- 4 kg. Stand testing of the instrument yielded the following results: range of angles measured $\pm 4'$; mean square error 2"; operating speed ≤ 0.01 s; steepness 12 V/angular minute.

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USSR

UDC 621.181.018.78.004(47+57)

YAKUSHIN, Ye. K., FUTORSKIY, B. M., MOSPAN, Yu. M., GRABLYUK, E. A.,
SANNIKOVA, V. M., and ZHELEZNYAK, V. P.

EXPERIENCE IN ADJUSTING AND OPERATING THE TPP-312 SINGLE-SHELL BOILER UNIT
AT THE LADYZHIN GRES

TRUDY VSESOYUZNOGO PROYEKTNOGO INSTITUTA 'TEPLOELEKTROPROYEKT' [Transactions
of the All-Union Planning Institute 'Teploelectroproyekt'] in Russian, No 17,
1976 pp 57-75

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 7 1976 Abstract No 7R89]

[Text] The rectangular-shaped single-shell boiler unit (950 ton/hr, 25.5 MPa, 565/570°C) is designed for burning gas pit coal of the Don basin with a heat of combustion of 5,000 kcal/kg. The furnace chamber is open with liquid slag removal. The pulverized coal burners (16 units) with a capacity of 8.5 ton/hr each are placed in two tiers opposite each other. The measures taken at the GRES to improve the operation of the boiler unit and the fuel pulverizer have made it possible to increase the load from 240 to

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USSR

YAKUSHIN, Ye. K., FUTORSKIY, B. M., MOSPAN, Yu. M., GRABLYUK, E. A.,
SANNIKOVA, V. M., and ZHELEZNYAK, V. P., TRUDY VSESOYUZNOGO PROYEKTNOGO
INSTITUTA 'TEPLOELEKTROPROYEKT', No 17 1976 pp 57-75

250 Mw to the nominal value. However, currently the duration of the nominal load is limited by insufficient draft and suction, because intensive fouling and disintegration have made the RVP-98 packing unreliable. In order to increase the reliability of the rotor of the RVP [expansion unknown], all seals should be replaced during major overhauls. Also, the air should be heated with electric heaters. It has also been decided to clean the RVP with thin streams of VD [expansion unknown] (to 20-25 MPa).
Illustrations 11.

2/2

USSR

UDC 621.482

KUTATELADZE, S. S., MOSKVICHEVA, V. N. and PETIN, YU. M.

USE OF A LOW-TEMPERATURE HEAT CARRIER IN GEOTHERMICS AND FOR UTILIZATION OF SECONDARY ENERGY RESOURCES OF INDUSTRIAL ENTERPRISES

Moscow VSES NAUCH-TEKHN SOVESHCH. ISPOL'Z TEPLA ZEMLI DLYA PROIZ-VA ELEKTROENERGII [All-Union Scientific-Technical Conference. Utilization of the Earth's Heat for Production of Electric Power, Collection of Works] in Russian, Texts of Reports, 1975, pp 10-13

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 4 1976 Abstract No 4S61 by M. Ye. Zaydman]

[Text] For production of electric power utilizing a low-temperature heat carrier the most promising plans are with a low-boiling working body, e. g., freon. The increased density of the vapors of freon make the turbine more compact than a turbine for water vapor. However the high cost of freon requires special measures against leakage. The experimental geothermal thermoelectric power plant of the Institute of Heat Physics of the USSR Academy of

1/2

USSR

KUTATELADZE, S. S., MOSKIVICHEVA, V. N. and PETIN, YU. M., VSES NAUCH-TEKHN SOVESHCH. ISPOL'Z TEPLA ZEMLI DLYA PROIZ-VA ELEKTRO-ENERGII, 1975 pp 10-13 [From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 4 1976 Abstract No 4S61]

Sciences at the Paratunsk thermal waters of Kamchatka is equipped with a 750-kW freon turbine. The turbine is 1-stage, console-type with an aluminum working wheel and has only one seal. The maximum efficiency is 0.84. The specific generation at a temperature of the heated water of 90°C is 3.91 kW·h/t. In servicing the freon in the amount of 12 t, for 4 years only 260-290 kg have been lost. The results of the research and testing showed the possibility of creating industrial freon installations with a high degree of automation and reliability. The systems of low-potential geothermal thermoelectric power plants may be used also for utilization of secondary energy resources for industrial enterprises.

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USSR

UDC 658.26:621.311.23.001.3

RAZGIL'DEYEV, G. I. and YEFREMENKO, V. M.

UTILIZATION OF A TURBOSCREW ENGINE AS A HEAT GENERATOR FOR RESERVE
OF MINING HEAT SUPPLY

SB NAUCH TR KUZBAS POLITEKHN IN-T [Collection of Scientific Works
from Kuzbas Polytechnic Institute] in Russian, No 74, 1975 pp 49-
52

[From REFERATIVNYY ZHURNAL, TEPLOENERGETIKA No 6 1976 Abstract No
6S244]

[Text] Air heaters for mines, especially in regions with heavy
climatic conditions, refer to users of the first category with
respect to reliability of electrical supply. Computation proved
that with the overall utilization of an aviation turboscrew en-
gine type AI-20 for emergency reserve of electrical supply and
heat supply for mines the economic efficiency of the engine is
increased by approximately 8-15% in comparison with that in the
utilization of the engine only as a power drive. Figure 1; ref-
erence 1.

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USSR

UDC 621.165:621.311.25:621.039

KOSYAK, YU. F., ARKAD'YEV, and SUKHININ, V. P., Khar'kov

TURBINES OF THE KHAR'KOV TURBINE PLANT FOR ATOMIC ENERGY PLANTS
AND THE PROBLEMS ARISING IN DESIGNING THEM

Moscow IZVESTIYA AN SSSR, ENERGETIKA I TRANSPORT in Russian No 2
Mar-Apr 76 pp 113-123 manuscript received 21 Aug 75

[Abstract] The authors describe the design of powerful moisture-
steam turbines manufactured and designed at the Khar'kov Turbine
Plant for atomic electric power plants. They pay attention to
the specialists and scientific staff working in the field of tur-
bine construction and in neighboring fields, to the necessity of
solving the basic problems associated with the use of moist steam
in the turbines, to its large volume consumption and to other
characteristic conditions of operation of such turbine installa-
tions. Figures 3; references 3: 3 Russian.

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USSR

UDC 621.431.74.048:621.436-185.3

POCHTOVOY, A. P.

HARMONIC COMPONENTS OF PERTURBING MOMENTS OF DISTRIBUTION SHAFTS FOR LOW-SPEED DIESELS

Leningrad SUDOSTROYENIYE in Russian No. 6, 1976 p. 31

[Abstract] The distributing shafts of powerful low-speed diesels produced by the Bryansk Machine Building Plant sometimes develop dynamic phenomena causing changes in the phases of gas distribution in individual cylinders and damage to the rolling surfaces of lifters or cams. Presuming that these phenomena result from uneven rotation and torsional oscillations, this article presents a study of the perturbing moments arising on the cam drives of an exhaust valve and the high-pressure fuel pump.

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USSR

UDC 621.186.68

YAKOVLEV, B. V., ZOLOTAREVA, V. A.

STUDY OF THE POSSIBILITY OF USING BASIC DEAERATORS IN THE SLIPPING PRESSURE MODE

NAUCH I PRIKL PROBL ENERGETIKI in Russian, No. 2 Minsk, Vysheysh Shkola Press 1975, pp 16-21

[Translated from REFERATIVNYY ZHURNAL 49. TURBOSTROYENIYE No. 4, 1976 Abstract No. 4.49.81]

[Text] Results are presented from analytic studies showing that the operation of the deaerators in the K-300-240 unit with loads of 100-250 Mw in the slipping pressure mode increases the power of the unit by 1200-2000 Kw and assures an annual savings of 1400-1600 tons of standard fuel. 4 figures; 1 reference.

1/1

USSR

GORBENKO, G. A., FROLOV, S. D.

STUDY OF THE SURFACE SEPARATORS OF JET PUMPS OF LIQUID WITH A CARRIER GAS

VOPR. GAZOTERMODINAMIKI ENERGOUSTANOVOK. VYP. 2 in Russian, Kharkov 1975, pp 72-79

[Translated from REFERATIVNYY ZHURNAL MEKHANIKA No. 7, 1976 Abstract No. 7B1066 by the authors]

[Text] Results are presented from an experimental study of six models of surface separators ("wedge" type) of jet pumps of liquid with a carrier gas, with increased curvature of the separating surface in the final sector. It is demonstrated that the most effective separator is that with additional rotation of the separated stream by about 36° . An experimental dependence is presented between the gas content of the separated stream and the separation factor, the values of velocity factor which can be achieved, allowing better prediction of efficiency of systems with jet pumps. 7 references.

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Refrigeration

USSR

UDC 628.84:532.529

STOLYAROV, A. A., All-Union Scientific Research Institute for Gas

REFRIGERATION CYCLES WITH TWO-PHASE JET POWER SEPARATOR

Moscow KHOLODIL'NAYA TEKHNIKA in Russian No. 7, 1976 pp 9-13

[Abstract] Refrigeration cycles with two-phase jet power separator, due to the simplicity of their design, can be widely used in aviation and marine technology, in transport, in the chemical and gas industries and in many other branches of the economy. A diagram of the device is presented. Liquid under pressure enters a chamber, from which through a system of small apertures it flows into a mixer, where it is mixed with a gas fed under pressure through a side aperture. The coarsely dispersed mixture formed in the mixer is further dispersed and accelerated to high supersonic velocities in a Laval nozzle. As the gas expands in the Laval nozzle, extremely low static temperatures arise in the gas and, due to internal heat exchange, the finely dispersed particles of liquid are significantly cooled. After the nozzle is a deflector and separator, in which the cooled liquid is separated from the gas. Experimental and theoretical results are presented, confirming the expediency of industrial realization of this type of cooling unit.

1/1

USSR

UDC 621.595.9

BLUVSHTEYN, N. D., Scientific Research Institute of Chemical Technology for Domestic Services, and VAYN, L. N., Informelektro

SUITABILITY OF DOMESTIC REFRIGERATORS FOR REPAIR

Moscow KHOLODIL'NAYA TEKHNIKA in Russian No. 6, 1976 pp 15-17

[Abstract] The authors suggest indicators which more completely characterize the repairability of domestic refrigerators than the mean time between failures and other traditional indicators. They can be divided into three groups: indicators evaluating the convenience of maintenance and repair; indicators of the ease of testing of a structure; and the labor consumption of the repair required. Since increase complexity of design of refrigerators improves consumer qualities but reduces repairability, factors of this type are necessary to help in selecting a compromise design for new refrigerators to satisfy the public and at the same time minimize maintenance costs.

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CSO: 1861-

- END -

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