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17 APRIL 1987

CHINA REPORT SCIENCE AND TECHNOLOGY

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NATIONAL DEVELOPMENTS

INFORMATION SYSTEM OF CHINESE ACADEMY OF SCIENCES DISCUSSED

Beijing KEYAN GUANLI [SCIENCE RESEARCH MANAGEMENT] in Chinese No 1, Jan 87
pp 20-25

[Article by Sun Chengquan [1327 2052 2938] of Lanzhou Library of Chinese Academy of Sciences: "Discussion on Information System of the Chinese Academy of Sciences"]

[Text] In this article, we proposed that on the basis of the original library information work, the Chinese Academy of Sciences should organize a multilevel, multiserial, and multifunctional information network including the documentary information, data information, topic information, foreign relations information, technological information, scientific research management information, and discipline information organs and the information branch organs; that it should strengthen the coordination and cooperation of these organs and branch organs in order to form a large integral information system; and that it should establish an information committee to strengthen centralized management and to strive for the optimal objective of the overall system. We also submit our views and proposals on the solution of some special problems in the present information work.

I. Situation and Present Conditions

Since the 3d Plenum of the 11th CPC Central Committee, China's information work has undergone rapid developments because of the gradual improvement of the state's information system, the formulation and implementation of a series of information policies, the consolidation of the information work force, and the gradual modernization of the means and facilities required. The understanding of scientific and technological information has in particular started a forward leap, and the awareness of the need for information has been greatly heightened throughout the whole of society. This awareness has risen from that of a general nature in the initial stage--the awareness of scientific information work as merely a component of scientific and technological work, a condition for its development, and an important factor in economic development--to the awareness that information is one of the most important, lowest cost, and most crucial resources; and that the work of scientific and technological information is an important means of promoting economic, social, and scientific and technological developments, a catalyst for technological progress, a newly emerging science occupying a strategic

position in the overall development, a comprehensive technology, and an important undertaking.

Information work in the Academy of Sciences has also developed rapidly in the same period. The concept of "library information work as one integral whole" and two "parts" (namely, library information work as part of scientific and technological work, and library information personnel as part of the scientific research personnel) was introduced at the first information work conference held in 1978. This concept has produced profound effects in China. The academy, the branch academies, the research institutes, and the library information organs at various levels were strengthened; the basic documentary work, the information service, and the work of information investigation and study were improved in varying degrees; a number of information journals and scientific data search journals were published; and information networks and documentary data banks were set up for certain disciplines. The 16 representative information achievements, for which applications for scientific-technical progress rewards have been filed, not only revealed the high standards of information service offered by the academy for the state and the academy's key projects, but also reflected the social and economic benefits gained. In 1985, at a meeting held in the academy president's office, it was decided that the name Library of Chinese Academy of Sciences be changed to read Documentary Information Center of Chinese Academy of Sciences. This was an important policy decision in further strengthening information work.

However, as shown by the operation of the academy's information system as an integral whole, there are still problems affecting this work's progress. The main problems are:

1. Many leaders at various levels do not attach much importance to information work, and the leadership is weak.
2. The development within the information system is uneven, and the infrastructural work is weak.
3. The resources are dispersed and the system is not well organized with the result that its superiority as an integral whole cannot be brought into play.
4. The channels of information are narrow. Without breakthroughs at many points, information and feedback cannot circulate freely.
5. A close relationship between the work of information and the development of scientific research is still lacking.
6. Information work and publication work are disjointed.
7. The facilities are backward.
8. The objective of the system's development is not clear.

Since the Chinese Academy of Sciences is oriented to the world, to the future, and to economic construction, and has to adapt itself to the current developments, breakthroughs should be made in its information work, and the system should be strengthened to function as an integral whole.

II. Objective of the Development of the Academy's Information System

Japanese people take the greatest pride in their ability to know about any important events in the world within 24 hours of their occurrence. Miki Takeo, former Prime Minister of Japan said: All developed countries in the world have attached great importance to information. Japan is particularly successful in information handling. In information work, we should learn from the foresight and stamina of Japanese people and from the means and methods they use.

Each worker and each work department of the academy should strengthen their concept of information. "We should enquire about, keep our ears open for, and keep track of the most up-to-date scientific knowledge, the most up-to-date advanced technology, and the current trend of science and technology every year, every month, and every week." (Comrade Hu Yaobang's comments on a document in 1983.) As long as it is legal, each person or department in any place and at any time has the duty and responsibility of searching and exchanging scientific and technological information. The effectiveness of their searching and exchanging information will be one of the main criteria for the evaluation of the work performance of a unit or a department.

To eliminate the problem of different Chinese delegations usually asking the same questions on their inspection visits to the same unit abroad; to avoid the extensive overlapping of scientific research projects at low levels in China; to solve the problem of collecting information at home, which is more difficult than collecting information from abroad; and to strengthen the dissemination, introduction, popularization, and application of the scientific and technological achievements at home so that they could more effectively support scientific research and increase the industrial productive forces in the country, our information system should be of an open type in which the ideas are pooled and all resources are shared in cooperation at each level, and which are full of vitality and are prompt in information transmission and feedbacks.

The short-range goals of the academy's information system are as follows:

1. Increase the exchange of information by expanding the channels (such as the channels of documentary information, data information, verbal information, and information through real objects). In addition to the traditional way of searching documentary information, we should strengthen the cooperation and exchange between domestic and foreign sources, and among the scientists. Furthermore, in accordance with the relevant regulations of the Science and Technology Leading Group under the State Council, we should set up and strengthen a report system in the academy for scientific and technological information so that the important information of this type in or outside the academy could be promptly collected and circulated in the academy and reported

to the CPC Central Committee, the State Council, and the State Science and Technology Commission.

2. Take effective measures to promote information circulation. With modern methods, including the use of computer on-line retrieval, we should set up a number of data banks, promote the dissemination, reporting, and searching of documentary information and the publication of academic works and information journals, and expand the scope of supplying information at home and abroad.

3. Improve the quality of information service. First, we should strengthen the work force and the infrastructure of documentary information. Second, we should step up our scientific research and particularly our information service and our investigation and research in the state's knotty problems and the academy's key projects. Information work must be closely related to scientific research before it can fully display its merits, gain full vitality, and win recognition and respect from the scientific research personnel and the society.

III. Function of the Academy's Information System

The academy's information system is a functional system supplying scientific information to its consumers. Generally, the scientific research personnel are also the information consumers, because they have to assimilate and use a great deal of scientific and technological information. Yet they are information producers, because after completing their research, they would produce or put out a great deal of information. Thus the cycle goes on, and the standards of scientific research continue to rise along with the intensification of the research. That is why for the functioning of the academy's information system, we need not only input, but also output.

Information work applies to the entire process of knowledge transmission and information circulation, including the searching, processing, sorting, storing, retrieving, and finally the supply of information to consumers. Therefore, in addition to the input and output functions, the information system should also perform the functions of processing, storing, self-regulation and self-control.

According to the academy's information system, input applies not only to the scientific and technological information at home and abroad, but also to all information relevant to the academy's science and technology (including the information on the needs of science and technology). The input data are mainly from 10 categories of documentary information published for the public at home and abroad (namely, scientific and technological pictures and books, periodicals, reports, minutes of meetings, academic theses, government gazettes, patents, standards, product samples, and science journals) and the various scientific and technological materials published and distributed within the academy, as well as the scientific and technological files in its custody. In addition, we should pay attention to the collection of concrete audio-video objects and samples, or the most sensitive information media for people's viewing (inspection) and hearing (from scientists' talks), and the timely and very inspiring information (which are called "zero order information" in foreign countries). For the collection of information, we

need not only professional documentary information personnel or organs, but also the broad masses of scientific research personnel, the personnel of all departments connected with scientific research, and particularly the information sources of famous scientists (the sources for obtaining information to satisfy individual "information needs") which are of many different kinds and are fairly fruitful. We must also take effective measures to treat the exchange of information and data among individual scientific research workers as a function of the information system, and to practice the system of "sharing resources." This task must not be overlooked.

There are traditional methods of manual processing as well as modern methods of document and data processing with the use of modern computers for the compilation and storage of information. Different departments of the academy have different duties in the transmission and exchange of scientific and technological information (such as studying the work progress, reporting on the results, compiling scientific and technological statistics, handling foreign affairs, and supplying materials). Therefore, in addition to the documentary information organs and the scientific data libraries, all the disciplines, bureaus, and offices in the academy should have their share of responsibility for information processing. The information from various report forms, work bulletins, bulletin boards, and other sources regarding the current events should be collected and compiled for circulation in the academy. This task is quite important, but timely collection and circulation are by no means easy. That is why people generally feel that collecting information from domestic sources is more difficult than from abroad.

The target of information output, that is, the units or individuals using the information, may be in or outside the academy. The units engaged in information output are not only the documentary information organs, but also the editors of the Science Publishing House, the Scientific Press, and various academic and information journals.

In this system, the control of all activities concerning information from either a macroscopic or a microscopic point of view must be timely and effective, and its control function must be authoritative. Therefore, the organs exercising their special functions must be real, and not unnecessary or nominal, entities.

IV. Characteristics of the Academy's Information System

The academy's information system, like the systems of the industrial branches and the National Defense Science and Technology Commission, is a component of the State's scientific and technological information system. If we say that the information institutes of various provinces and cities mainly serve the "spark plan" of the state's science and technology, then the information system of the academy should mainly serve its "torch plan."

The information system in the academy is one of the subsystems of its major system. There are also the scientific research management subsystem and the technology safeguard subsystem. All these subsystems support the major system to ensure its success.

The academy's information system should be an open one with external links to the state's and the other information systems in cooperation and division of work.

The function of information in serving scientific research and in being part of scientific research dictates the need for centralization in the management of information. In other words, the substance, methods, and orientation of information work as well as the tasks of information organs at various levels should be coordinated by the academy according to the requirements of scientific research, and the distribution of work among these organs should be based on a unified management plan. Therefore, it is a management system tending toward "centralization." A characteristic of the centralized information system is its ability to perform certain new functions which any branch system cannot perform independently. Its goal is optimization in the overall system, that is, to obtain the best information in the quickest way and with a minimal expenditure of manpower, materials, and money. The State Council's approval for the establishment of an information bureau in the Station Science and Technology Commission in 1984 is an important step precisely for strengthening the centralized management of the state's information system.

V. Proposals on the Organization of Chinese Academy of Sciences' Information System

The information system of the academy should take the form of a multilevel, multiserial, and multifunctional network with criss-crossing links connecting various information organs specially or concurrently engaged in information work.

The highest organ in the system (the command and control center) is the information work committee (qingbao gongzuo weiyuanhui) of the academy, a new name for the information committee for the publication of pictures and books (chuban tushu qingbao weiyuanhui) after its reorganization and consolidation. Its major tasks are to study and formulate information policies, work regulations, programs, and plans for the entire academy; to manage and coordinate the search for and exchange of scientific and technological information throughout the academy; and to organize the academy's information resources in serving scientific and technological policy decisions and the state's important scientific research projects.

The main branch systems are as follows:

1. Documentary Information System

This special information system is formed of the documentary information center of the academy, the libraries (regional documentary information centers) of various regions, the libraries of the branch academies, the library information office of various research institutes, and some subsystems. The documentary information center of the academy is the center of information storage and retrieval, the center of academic research, and the center of organized coordination. It is responsible for liaison among the international organizations, the state information bureau, the state

information institute, the state library, and the information institutes of various ministries and commissions, and for the coordination of their activities. The libraries of regions and branch academies should be the centers of document information storage and retrieval and centers of organized coordination suitable for the environments of their own regions and branch academies. The library information offices of research institutes should become the consultation service departments of their own special organs or disciplines in the storage of documents, the retrieval of special documents, and the analytical study of special information.

2. Data Information System

This is the information system comprising the data bank preparatory department and the individual numerical and special data banks of the academy. The preparatory department should be responsible for organizing and planning the building of all data banks in the academy; for building documentary data banks with the coordination and cooperation of the documentary information systems; for organizing in-line networks; and for forming links with the database organizations and the departments concerned at home and abroad.

3. Project Information System

The main task of this system is to report periodically on the achievements of scientific research, the progress of special projects, the signing, implementation, and fulfillment of contracts, the news concerning patents, and the management and use of scientific and technological files. This system is formed of the academy's planning bureau, scientific and technological contracts bureau, scientific fund bureau and the business planning departments of various branch academies and research institutes.

4. Foreign Information Systems

Its main task is to collect various types of information from the personnel on inspection trips abroad, the personnel receiving foreign scholars during their visits to China, the scientists serving in various international academic organizations, and the participants in international exchange and cooperation. The foreign affairs bureau and the international cooperation bureau will be responsible for the collection of information on trends in science and technology, new achievements, new theories, new methodologies, and new technologies in the world; on the establishment of new departments; and on the appointment of well-known experts, the personnel disposition, and the funds, materials, and equipment used by relevant scientific research units in foreign countries. The foreign affair administrators and those participating in foreign affairs should also share this responsibility.

5. Technical Equipment Information Systems

The new technology development bureau, the technical conditions bureau, the Oriental Scientific Instruments Import-Export Corporation, the engineers of various institutes, and the administrators of instruments and heavy equipment will collect the information concerning the means of experiments and the instruments and equipment used by the large scientific research centers,

testing centers, and open laboratories at home at abroad; and the technical and economic information of the scientific research materials market.

6. Scientific Research Management Systems

The staff office, the policy research office, the cadre bureau, and the education office will be responsible for the collection of the information needed by the scientific research administration institute, and for the work of statistics, analysis, and exchange of information.

7. Subject Information System

The department, subject, or special information networks, and the information office of various institutes, in collaboration with the special academic associations, academic groups, and the cooperating units on certain projects will supply the relevant information; organize investigations and study, and provide information for the strategy of scientific development. The discipline (specialty) information network will have the responsibility of editing information retrieval journals for publication by discipline (specialty), setting up data banks, providing monographic information service, and conducting research in information for scientific development.

8. Information Exchange System

Its main task is to step up the academy's propaganda in foreign countries and the work of publication. The Science Publishing House and the editorial departments of various research institutes should strengthen the publication of academic monographic works, academic journals, and information journals. It should periodically report on the trend of academic publications, and supply the relevant documentary information. On the basis of accelerating the publication cycles, it should step up its work in publication and distribution to help publicize the Chinese Academy of Sciences' research and increase its influence. Besides publicizing the academy's activities, the Scientific News Agency and its special contributors and correspondents should also collect the relevant information on scientific developments at home and abroad.

These branch systems do not exist in isolation, but are closely coordinated for the timely exchange of information.

VI. Several Important Problems To Be Solved in Current Information Work

1. Further Acquaint the Leadership at Various Levels with the Latent Value and Significance of Information Work in Scientific Research Development

On listening to the reports from the party organization of the Ministry of Chemical Industry in 1986, Comrade Hu Yaobang pointed out: "Have all our economic branches set up their own department for new international technologies and techniques? We now have too many departments and bureaus in charge of standards and always issuing orders, but very few in charge of research in new products, new technologies and the trend of scientific research in the world. Administrative methods are what they use. This practice must be changed. You must regard the international news and

information on science and technology and their imports as your important duties. (See KEJI QINGBAO GONGZUO [SCIENCE AND TECHNOLOGY INFORMATION WORK] No 3, 1986 p 1)

Comrade Zhao Ziyang also said: "In either foreign trade or domestic economy, we must regard information as a major issue. We must import some technology, manufacture some equipment, and train a number of skilled personnel." "The information must be accurate and readily available, the time of its transmission must be shortened, and the work efficiency and productivity must be greatly increased before the economic policy decisions can be made on a reliable basis. ...That is why information has tremendous effects on economic development and social progress." (His talk in a small symposium held by the State Council on 9 October 1983) Reviewing the conditions in our economy in the light of these remarks, we will find that although we have done a great deal of work in strengthening documentary information and building data banks, the functional organs of leadership over information work are getting weaker and weaker. The spirit behind the National Information Conference of 1984 and the symposium on the reform of the national science and technology information system was not thoroughly carried out in the discussions on the academy's conditions. The plans for developing and coordinating information work for the entire academy are still lagging behind. These macroeconomic problems are in urgent need of solution.

2. Strengthen the Centralization of Management and Coordination

First, we must strengthen the coordination of work within the information system of the academy.

Second, we must strengthen the coordination of work among the academy's documentary information center, the various regional libraries, and the branch academies' libraries. In the layout of documentary facilities, we do not want what is "large and complete" or "small and complete." All resources must be accessible to everyone, and each facility should have its own specialty. They must all combine to offer information service for all important projects, for personnel training, and for academic research.

Third, we have to form a strong information network of departments and disciplines (specialized), and strengthen their lateral ties. In the academy, there are many institutes and specialized disciplines which are fairly prominent and unique. They are occupying leading positions and exerting strong influences at home and abroad. If we can strengthen the organization of the information network and combine the strengths of the group to form a powerful single force, we will be able to do a lot more work.

Funds for the academy have been fairly tight in the past 2 years. Because of the need to distribute their limited manpower and materials among the key projects, some research institutes usually could not be sure of the availability of funds and the required working conditions. In view of this, the information committee of the academy may appropriate a certain proportion of the institute's basic funds (including the funds from contracted projects) to be used as information operating funds. The academy can set the quota of special funds to be used for special purposes. These funds can be divided

into in two portions: One portion can be used for the purchase of documentary data and publication of academic information journals, and the criteria of appropriation should be reviewed according to plan each year. The second portion can be used on information service projects. In the future, all projects of information investigations and study, information service, and data bank building, like all scientific research projects, will be included in the project plan to be confirmed, examined, and approved before the project funds can be appropriated.

3. Strengthen the Infrastructure and Basic Levels

Strengthening the infrastructure, which essentially means the standardization of documentation and the setting up of the system of retrieval from journals, documentary data banks, and networks, is the prerequisite for efficient information investigation and study and information service. Strengthening the basic levels mainly refers to personnel training, readjustment of structure, collection of basic documents, popularization of computer knowledge, and appointment or training of directors for all research offices and libraries. To solve the problems of personnel shortages and incompetence, we must on the one hand readjust and strengthen the work force and, on the other, adopt the system of concurrent information workers and guest information workers to encourage more scientists and technicians to participate in information work.

On the whole, by strengthening the academy's information system as an integral whole, we will be able to fully mobilize the resources in various quarters without increasing our personnel and investment, and offer more, better, and faster information for scientific research and for the entire society. We will also be able to help the academy to raise the standards of its scientific policy decisions and scientific research management, to make greater and quicker achievements, to produce more talents, and to make more and greater contributions to the state's four modernization program.

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NATIONAL DEVELOPMENTS

CHOICE, APPRAISAL IN TECHNOLOGY TRANSFER DISCUSSED

Beijing KEYAN GUANLI [SCIENCE RESEARCH MANAGEMENT] in Chinese No 1, Jan 87
pp 26-28, 38

[Article by Huang Qingming [7806 2348 2494] and Wang Xiang [3076 5046],
Industrial Management Engineering Department of Zhejiang University: "Choice
and Appraisal in Technology Transfer"]

[Text] Technology transfer is an important measure for raising overall technological standards in China. In choosing a technology for transfer, we should be guided by the principle that it must be suitable, advanced, and able to serve us to the best advantage. All technologies have their special characteristics, and there are different reasons for their competitive selection according to conditions in China. In technology transfer, we must observe their effects on the entire system as well as the system's restriction on them. The Soviet Union's experiences can be used for reference.

The crux of the four modernizations program is the modernization of science and technology. Raising the scientific and technological standards, and particularly the standard of production technology of the country is a crucial step toward the grand objective of accomplishing China's socialist construction. Obviously, technology transfer plays a particularly important role in raising these standards, because it determines the extent and depth of technological progress. To a certain extent, the choice of technology is also a deciding factor in technology transfer. The reason is that if the choice is correct, more technologies can be transferred and technological progress can be accelerated. Here are some views in this connection. These views are based on the national point of view, although, in fact, many ideas behind them are applicable to the choice of technology in the transfer between different regions of the country.

I. Principle Behind Choice of Technology in Technology Transfer

Because of our inexperience and our hasty attempt to put an end to our poverty and backwardness during the initial period of our policy of opening to the outside, we imported the most advanced scientific and technological equipment from the advanced countries in the hope that these imports would help us modernize our industry. The result was "more haste, less speed" and "trouble for being too clever." Later, when we became a little wiser, we reviewed our

experiences and imported "suitable technologies" according to China's actual conditions. The so-called suitable technologies refer to those which could yield maximum benefits under China's existing conditions of production, market capacity, social and cultural environments, and technological level. In foreign countries, "suitable technology" is required when "intermediate technology" is considered not good enough to be imported. If we say that "intermediate technology" represents the technological level, then "suitable technology" would be the answer to the question of whether the technology is suitable for an extensive import environment and other special import requirements. This method would obviously prevent rash action in importing technology and ensure its good effects on the region (or unit) concerned. Therefore, it is superior to importing "advanced technology." However, it still has some shortcomings. First, the fact that China, though a third-world country itself, is different from other third-world countries is not taken into account. Although its technological level as a whole is low, it is still advanced and fairly advanced in certain areas, and has a fairly firm foundation of its heavy industry. If we only adhere to the principle of "suitability" in importing foreign technology, then our imported technology can only meet the requirements of "acceptability," but not those of "feasibility." We know that in exporting any technology to China, the exporting country usually sell their "second-rate goods." Therefore, if we only follow the principle of "suitable technology," we would be crawling behind the advanced countries indefinitely instead of accelerating the all-around development of science and technology and economy. Second, because of the uneven scientific and technological developments in China, the backwardness of some technology may be only due to our failure in tackling certain key problem of advanced technology. The technology is then not entirely backward. If our choice is guided only by the principle of "suitable technology," we may not be able to solve this problem. Third, from the standpoint of systems theory, "suitability" is essentially a means of obtaining a balanced development of the original system, but not necessarily the means of optimization for the system. The development of a system follows the law of developing from equilibrium to a new disequilibrium. Therefore, the measures to promote a system's development should discard the original "nonideal" balance in favor of a new and better balance in the system. To accomplish this purpose, the principle of importing "suitable technology" is not enough.

Therefore, we introduce the guiding principle of importing "suitable advanced technology." This principle implies that the imported technology should be both advanced and suitable for the present environment. It remedies the defects of the method of importing "suitable technology" to some extent. However, since it is mainly concerned with whether the technology is advanced and suitable, the improvement of the key points in the system, the utilization of the original advantages, and the "nurturing" of new advantages are overlooked. The possible result is that each importing unit will judge the advanced quality and the suitability of the technology in serving their own interests. Furthermore, in the absence of any priority set for imports, the state's investment is dispersed, and the imported technologies become overlapping and chaotic, making it difficult to form any "collective" strength. Therefore, we hold that in importing foreign technology now and for some time to come, we must consider three factors--namely, its suitability,

advanced quality, and ability to serve us to the best advantage--and particularly its suitability to the strategy of scientific and technological exploitation and the strategy of economic and social development, in the hope that the technology will enable us to utilize our original strength and to generate new strength in an upward spiral, to build an industry enjoying due advantages, and to obtain good economic and social benefits.

II. Choice of Technology and Question of Technology Selection

At present, the elimination of technology in the major industries according to market demands in Western developed countries can be roughly classified under three categories:

A. "Selection" of newly emerging technologies. The updating of computer technology (equipment) comes under this category. The rapid advance, the strong adherence to vogues, and the "speculative nature" of newly emerging technologies are the decisive factors of their rapid updating, rapid reduction in production costs, large profits (from high productivity), and high risks. Because of these characteristics, the selection of these technologies is usually fairly thorough. That is why we call them "technologies for complete selection." We must be prudent in dealing with these technologies. Whether they should be imported or not, and how many of them should be imported (and developed) must be decided by whether they can be used, how urgently are they needed, and how much benefit can be derived from them. Furthermore, their use must be limited to those units with high utilization rates, good social and economic results, and strong capabilities of mastery and application. Japan's experiences in importing, mastering and applying the technology of steel smelting during the 1950's and 1960's are good points of reference. In consideration of the rapid development and high risks involved in the technology of steel smelting at that time, Japan did not hastily import this technology for the plants. It imported two sets of each equipment--one for training purpose in the institutions of higher learning and for the administrative and research personnel, to be sure that these advanced technologies could truly serve the purpose of producing the best economic results; and the other for the research organs. (At that time, these organs were combined to form the "top-blown oxygen technology research institute" and the "blown heavy oil steel smelting technology research institute." The former was organized in 1956 and mainly intended for the technology of top-blown oxygen steel smelting technology invented in Austria in 1953, and the latter was organized in 1962 and mainly intended for the technology of steel smelting.) Research in reverse engineering was conducted in these organs to ensure that the imported technologies would occupy a leading position in the steel smelting industry in the future. In our case, however, technologies were blindly imported in some quarters regardless of the personnel and resource conditions at that time and place. For example, huge sums of foreign exchange were spent on duplicate imports of computers and other advanced equipment, although they could truly produce good results only in the institutions of higher learning, the research institutes, and some large and medium-size enterprises. Many sets were left idle, causing tremendous financial losses.

B. Technical "selection" of traditional equipment. It means that a certain function of the traditional equipment affects the efficiency of the whole set and causes fairly high expenditures. However, some new technology can replace this function, and will not only reduce costs, but also greatly increase labor productivity. For economic reasons, the original technology has to be eliminated. This elimination is only related to a certain environment and therefore called "selection of technology due to local environment." The replacement of tradition equipment with low levels of automation by equipment of high automation is an example of this category of "selection." We should decided whether or not this type of eliminated technology should be imported, or on what scale should it be imported, according to the actual conditions in the localities and units concerned. It would be improper for us to rule out these imports indiscriminately. In handling technologies (equipment) of this category, we should note the following conditions: 1) Their transformation and updating are not particularly difficult. In some cases, the addition of some automated parts may transform some very backward equipment into a fairly advanced, or even very advanced one. For example, an old machine tool in the Wuhan Turbo-generator Plant, after the restoration of its fine precision with such advanced technologies as metal brushing and plating and the addition of a microcomputer control system, immediately became a new machine tool of the 1980's level, and its productivity was increased several times over. (Details reported by GUANGMING RIBAO in an article entitled "Old Equipment with Computer Control; A New Way of Technical Transformation in an Old Enterprise.") 2) According to the rules of equipment depreciation in the enterprises of Western capitalist countries, some equipment must be written off after a certain number of "service" years regardless of the extent of its actual wear and tear. If the time is appropriate and the negotiation goes well, we can usually purchase this type of equipment at a low price. 3) The importation of such equipment is of great, real significance in the basic training of our personnel and in laying our industrial foundation. At least, this is rational as a "transition." Of course, it does not mean that given these conditions, we can import this type of equipment wholesale. Each transaction should be handled as required by China's national conditions. We hold that if some equipment is urgently needed in large quantities and our productive capacity cannot meet this need; and if it is needed to produce something new in China, we may consider importing it to build our own foundation. This should be the way for importing technology of this type from abroad. However, if this technology is available at home, although its productivity, degree of precision (generally) or performance cannot match those of foreign countries, the undeveloped or "blank" regions should "import" from domestic sources. The units concerned should create the conditions for transfers and use some of their resources in the "exploitive transformation" of the equipment. At present, some undeveloped regions are only concerned with the import of advanced technology from abroad and have adopted the strategy of waiting for funds for this purpose. We believe that this situation should be changed.

C. Twilight technology (equipment). This mainly refers to the technology (equipment) of basic industries of the West. A special feature of this type of equipment is that its production has reached the saturation point (or become excessive) due to the limited market and fierce competition. However, because of the heavy investment involved and some other factors, it is easily

monopolized and may yield fairly high per-unit profit. Unless compelled to do so, therefore, people generally are unwilling to give it up or to allow any drastic price reduction. Instead, they usually update the technology more frequently in order to lower the production cost and thereby make great profits. Thus they are forced to eliminate a lot of equipment. Sometimes too, they may lose in competition, or, for some other reason, be forced to switch to other lines of production and to eliminate some equipment. Since the technology belongs to the "twilight industry," (a Western term), we call its selection "twilight selection." We should take a clearcut approach to this type of selection. Whether a technology is "twilight" or not depends on the extent of industrial development in the developed countries. The "maturity" of their basic industries does not mean that the same industries of ours have also reached maturity or the stage of saturation. Because of certain restrictions on the development of our productive forces, many basic industries in China are still in their fledgling stage. Under these conditions, if we can obtain at low prices some fairly advanced technology and equipment that can help accelerate the development of China's basic industries, why should we hesitate to do it? Because this involves the question of structure and level of China's basic industries, we should, of course, exercise great care and find out, first, how advanced are they and how easy will it be to update and transform them in the future; second, the volume of market demand for their products, so that the supply will not exceed the demand and leave the equipment idle; third, whether they can be produced in China, and if so, how will their social and economic results compare with those of imports, which should, if at all possible, mainly consist of mainframes; and fourth, the appropriate time to take advantage of the competition between technology exporters.

On the whole, the basic principle of selection and importation is that we must be active yet cautious, and pay attention to the importation and assimilation of advanced technology as well as the domestic conditions for its full utilization. The advanced technology and single pieces of equipment that are imported embody the software technology in patented inventions and technical secrets. If the choice is right, they can improve our production techniques and our economic results. Based on the present domestic situation and to save precious time, we may import some equipment which are urgently needed but cannot be manufactured immediately. As a guideline, however, stress should be laid on importing software. Only thus can we spend less time and money and produce quicker results.

III. Feasibility Analysis in Choice of Technology

In importing technology (equipment), feasibility analysis before, and follow-up evaluation during and after the importation are indispensable, as we all know. The problem is that many comrades have too vague an understanding of "feasibility." They seem to believe that feasibility analysis means only to see whether the technology is applicable in the existing environment. In fact, the observation of the effects of the technology on the whole system as well as the restriction by the whole system on the technology cannot be ignored. The purpose of feasibility analysis is to determine not only whether the project to be confirmed according to designated standards is feasible in technology, economically rational, and compatible with the ecological and

social environments, but also whether the project can be put into operation and under what conditions can it operate normally, such as what related industries or trades should be strengthened (or reduced in scope) to ensure operational efficiency; what would be the adverse effects of the operation on the environment; what preparation or readjustment should be made in advance to reduce these effects, and so forth. We should learn from the experiences of the Soviet Union in this respect. In the Soviet Union, as we can see, the importation of technological equipment could produce the following effects:

- 1) It requires a huge amount of internal resources for the directly supportive projects. For example, Volga Motor Vehicle Plant imported Western technological equipment worth \$550 million, and its initial outlay for support projects at home amounted to \$1 billion.
- 2) It requires a second and then a third wave of imports after the first. For example, the modernization of the motor vehicle industry required huge amounts of special steel, new tires, and high octane gasoline, all of which were not produced or sufficiently produced previously. Furthermore, a network of freeways, and large numbers of garages and parking lots had to be built.
- 3) It may generate demand for new imports.
- 4) It may lead to a demand for specialized manpower and material resources at home, such as the demand for highly skilled enterprise managers.
- 5) It may lead to, or accelerate changes in the distribution of resources among different departments at home and readjustment of the industrial structure.

All these are noteworthy issues. Further research is required on the criteria for the confirmation, the procedures of confirmation, and the establishment of organs for the organization of imported items.

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NATIONAL DEVELOPMENTS

PROBLEMS WITH TRIAL COMPENSATORY CONTRACT SYSTEM DISCUSSED

Beijing KEYAN GUANLI [SCIENCE RESEARCH MANAGEMENT] in Chinese No 1, Jan 87
pp 36-38

[Article by Li Han [2621 2498] of Beijing General Academy of Mining and Metallurgy: "Present Conditions and Problems with Trial Compensatory Contract System among Scientific Research Units Discussed"]

[Text] The compensated contract system has now begun in some scientific research units with good results. However, some problems and difficulties encountered must be solved and overcome. The present conditions and problems with the trial system in some scientific research units will be discussed and some personal views on them will be presented in this article.

In recent years, China's system of fund control has improved along with the economic development. In 1983, the State Commission for Restructuring the Economic System and the State Science and Technology Commission decided to change the operating fund system into a compensated contract system on a trial basis among some research units engaged in the development and application of science and technology. Later, with the implementation of the "CPC Central Committee's Decision on Restructuring the Economic System" and the "CPC Central Committee's Decision on the Structural Reform in Science and Technology," the compensatory contract system began its gradual development in some scientific research establishments. Implementation of this system signified a change in the scientific research units from consumer units under the "allocation system" to business units under the "economic accounting system"; from the system of free use of scientific research achievements to the compensated contract system; and from the system of uncompensated expenditures in scientific research to that of stressing economic results. Although the period of its implementation is not long, the great vitality of the compensatory contract system is already obvious. Implementation of the responsibility system in various forms is now giving, or will certainly give, an impetus to the reforms in scientific research management, organizational structure, personnel policy, and the policies of evaluation, distribution, and payment of wages and bonuses, and produce a driving force for China's vigorous scientific development and its four modernizations. However, this compensatory contract system, like all innovations, has encountered some problems and difficulties in the course of its development, and these problems and difficulties should be solved and overcome more thoroughly.

I. Over-eagerness To Make Money out of Contracts, Neglecting Basic Theories and Projects for Technological Exploitation

It is generally agreed that implementation of the compensatory contract system has produced very good effects in reforming the management and accelerating the progress of scientific research. However, unless the implementation is properly guided, mistakes may occur. For example, some research units are so over-eager to make money out of contracts that they are interested in the projects yielding direct incomes and neglect their research in basic theories and projects for technological exploitation. If this trend is not corrected in time, the cause of scientific research may be seriously jeopardized. For the solution of this problem, apart from ideological work and maximum preventive measures, the state and the departments in charge should allocate funds or grant subsidies for the important strategic research projects with a bearing on the basic theories and the technological reserve. After trying out the compensatory contract system, the operating funds of various research units should be reduced in varying degrees. (What should be clarified here is that while the reform should be conducted actively, we should attempt only what we are capable of. The operating funds of the research units should be reduced only in small amounts each year and any drastic reduction at the very start should be avoided; otherwise, it may affect the development of scientific research.) These operating funds, to my knowledge, are being kept by the departments in charge, and, furthermore, the units have to turn in part of their earnings to these departments. (The nonferrous metal departments have to turn in 10 percent of their net income after deducting the energy and transportation funds.) The departments in charge should return part of this amount to the units to be used in tackling knotty problems, and adopt suitable economic policies to guide the development of scientific research.

II. Economic Management System Unable To Meet Economic Accounting Requirements

According to the economic management system, and particularly the accounting system of the scientific research units, the former regulations for establishments regarding the headings in account books and the accounting forms are still being followed. These regulations can no longer meet all the requirements of economic accounting, and suitable reform must be carried out, such as in the method of research funds payment. (In July 1986, the Ministry of Finance and the State Science and Technology Commission changed the method of quota allocation to that of fund transfer). The bookkeeping system should be set up according to the research units' own characteristics or the accounting system of the industrial enterprises; some new headings should be added in account books to include project accounting and production accounting; and the accounting forms should contain new items to reflect the process and the result of economic accounting. The Ministry of Finance and the State Science and Technology Commission should collaborate with the departments in charge in studying the situation and working out a set of practical regulations for the economic management system so as to reverse the present situation of "letting a hundred schools of thought contend" in economic accounting. Furthermore, the economic research departments and the publication departments should organize the publication of some work on management knowledge concerning the current economic structural reform so as

to help the research units solve the theoretical problems actually encountered in economic management.

III. Problems in Distribution System and Reward Policy

At present, in accordance with bonus quotas stipulated by the state or the departments in charge, and approved by some higher authorities, the scientific research units have set up their own worker bonus funds (including the funds for presidents and institute heads) to be used as material incentive for their workers and staff members. These funds have produced certain effects in bringing about the smooth completion of scientific research tasks and other jobs, in arousing the enthusiasm of the scientific and technical personnel and all workers and staff members, and in promoting scientific and technical achievements. However, according to the current policy, there is a bonus ceiling for the research units whereby the total annual bonus fund cannot exceed the amount of one month's payroll. Even though this amount may be exceeded, the benefits would be restricted by the levy of a bonus tax. It is undoubtedly correct for the state to levy bonus tax as a means of controlling the increase in consumption funds, but this is contradictory to the spirit of rewarding the personnel taking over the management under contract, because no matter how good their performance and economic results, their bonus cannot be duly increased. In my opinion, the state should not insist on subjecting the entire income of each worker to the regulations of proportional appropriation of bonus funds. On the other hand, it should expand the scope of bonus tax exemption for incomes from such lateral sources as technology transfers, technical consultations, and technical services; work out some supplementary rules to provide greater freedom in collective welfare expenditures for the scientific research units, and give greater decision-making power to the units so as to arouse their workers' enthusiasm. At present, the operating funds allocated by the state to the research units each year are far from adequate for their development. Encouraging the workers to supplement the operating funds with revenues from other sources is now a major issue. If this issue is not settled, the development of scientific research will be seriously handicapped. In the unit to which I belong, the supplementary revenues amounted to 627,100 yuan and 1,200,300 yuan in 1984 and 1985 respectively. The system of distribution should be further improved for the bonuses to be fairly distributed under the principle of distribution according to work and rewarding the diligent and punishing the lazy. The following basic principles should be followed in actual distribution: The special nature of the labor of scientific and technical personnel, such as the uncertainty of the fruits of their labor and the nonrepetitive nature of their work, should be recognized, and their average income should be slightly higher than that of the administrative personnel. We should also recognize the different standards and economic results of different projects, and reward the good ones in distribution. The bonuses of the research academy (institute) personnel should be linked with the revenues of the academy (institute) in the current year so that they will be more concerned with the success or failure of their own unit.

IV. The Problem of Curtailing Expenditures in Functional Departments

The implementation of the system of economic responsibility of the affiliated research offices to their research units, and the trial implementation of the "system of responsibility for business operation" among the logistics service departments (including the workers' mess hall, the truck convoys, the daily life service companies under the system of collective ownership, and so forth) have produced certain effects in strengthening the personnel's concept of "increasing income and curtailing expenditure," in stimulating their efforts accordingly, and in drawing their attention to economic results. However the problem of "spending lavishly and exceeding the budget" (that is, exceeding the economic quotas based on the budgets submitted by the departments at the beginning of each year) among the functional departments is still unsolved. This problem is quite common in the research establishments, and according to what I have learned from the research units in the nonferrous metal system, no basically effective way has yet been found for its solution. It is suggested that the departments concerned should organize some comrades who are experienced in theoretical and practical work to discover some theoretical and practical methods to be popularized in the scientific research establishments.

V. Problems of Economic Accounting Work Force in Scientific Research Units and Organized Leadership for Economic Administration

Since the introduction of the compensatory contract system, the workload of economic accounting in the research units has greatly increased and the shortage of finance personnel in these units has become an acute problem. According to the regulations of the departments concerned, the number of finance personnel in a unit should not be less than 1 to 1.5 percent of its total personnel. From what I know, however, the number of finance personnel in many research units is less than 1 percent. (This has something to do with the tight measures taken by the personnel departments toward the finance departments after the introduction of the compensatory contract system.) Numerically, the difference is quite large, and qualitatively, the problem is even more serious. Very few finance and accounting personnel have received vocational training or been educated in universities, specialized colleges, or specialized secondary schools, and many of them lack even the basic theoretical knowledge of finance and accounting. Although their dedication has enabled them to make valuable contributions to the development of scientific research, they have no educational opportunity for professional advancement and their professional standards do not meet the requirements of the current economic reform. Nor can they make any quick progress on the basis of their present work. If we entirely rely on the universities and specialized colleges to produce qualified finance and accounting personnel, we would be like "waiting for water to be carried over a long distance to quench our thirst right now." Moreover, the university and specialized college graduates have to go through a process of linking theory with practice. The leadership at various levels should include the training of the present finance and accounting personnel in their meeting agenda and pay great attention to this matter. They should make an effort to provide the present finance and accounting personnel with a rotational training course in the near future, to be followed by advanced training step by step. Furthermore, when

the research units have begun to implement the compensatory contract system and to manage scientific research with economic means, the financial management and accounting, the payment of wages and bonuses, the distribution of other material benefits, and the economic appraisal of scientific research projects will entail a tremendous workload, and it would be difficult for the finance departments to cope with it single-handedly. Perhaps the large and medium-size scientific research units may learn from the successful experiences of the system of chief accountants in the production enterprises, and then practice it themselves. People in theoretical circles have for many years appealed for the assistance of chief accountants and finance departments for academy presidents (or the institute heads) in comprehensive economic administration, but the response to their appeal is still pending. In my opinion, the trial implementation of the chief accountant system in the large and medium-size scientific research units should be useful to either the finance departments in their work or to the scientific research units in their economic management.

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NATIONAL DEVELOPMENTS

SHANDONG SCIENTIFIC ASSOCIATION WORK REPORT

SK101140 Jinan DAZHONG RIBAO in Chinese 25 Feb 87 p 2

["Excerpts" of speech by Zeng Chengkui, chairman of the Shandong Provincial Scientific and Technological Association, delivered at the 21 February Third Congress of the Provincial Scientific and Technological Association: "Work Together, Plunge Into Reform, and Contribute Our Ability and Wisdom to Fulfilling the Seventh 5-Year Plan, and to Making the People Affluent and Shandong Prosperous"]

[Text] Entrusted by the second committee of the provincial Scientific and Technological Association, I will now give a work report to this congress for your examination and discussion,

Six Years for Pioneering Advancement

Since the second congress of the provincial Scientific and Technological Association held in 1981, mass scientific and technological organizations of our province have pioneered the way of advancement and created a new situation in their work thanks to the leadership of the provincial party committee and government,

Over the past 6 years, scientific and technological associations at various levels throughout the province have further expanded, and have become an important part of scientific and technological circles. Societies (associations and research societies) at the provincial level have increased from 58 to 89, and their members from 25,000 to 72,000. Societies at the city, prefectural, and county levels have increased from 390 to more than 1,700 and their members have increased from 28,000 to 155,000. Scientific and technological associations have been established extensively in 137 counties, cities, and districts. A total of 2,586 towns and townships, 97 percent of the total, have established such associations. More than 65,000 village associations for popularizing science with 1.15 million members have been established. A total of 205 industrial and mining enterprise scientific and technological associations with more than 26,000 members have been restored and established. A network of mass scientific and technological organizations with vertical and horizontal connections has been established in Shandong.

With the concern and support of party committees and governments at all levels, scientific and technological associations and their subordinate

organizations have upheld the four cardinal principles, implemented the policies on scientific and technological work, united with and relied on the masses of scientific and technical workers to work hard and pioneer the way of advancement, and scored fairly great achievements in their work over the past 6 years.

1. Various forms of academic exchanges focusing on the important tasks for scientific and technological, economic and social development have been organized.

Focusing on the needs of scientific and technological, economic and social development, societies at various levels have carried out academic activities at various levels and in various forms. Societies at the provincial level alone have sponsored 4,200 medium-sized and small seminars and annual meetings and advanced more than 51,000 theses and reports on special topics, of which more than 6,000 have been published at national academic meetings and academic journals, and more than 900 have been introduced at international academic meetings. They have established 48 kinds of academic journals.

Focusing on the development of the products of the Gilu 300,000-ton ethylene project, a key construction project of the state, the provincial Scientific and Technological Association and the provincial Planning Commission have organized experts from pertinent fields of the provincial chemical, chemical industrial, petroleum and other societies to conduct technical appraisals on three occasions, and offer suggestions to rationalize construction and specific plans. Leading persons of the provincial government have attached importance to these suggestions and plans and have accepted them for implementation. To counter the technical problems in our province's cotton production, the provincial Agricultural Society has conducted investigations on the "sustained growth of cotton production," and "rational planting," and has cooperated with the provincial textile society to hold seminars on improving the economic results of Shandong's raw cotton and the wheat and cotton two crop system. They have made contributions to the province's cotton production and the improvement of its overall economic results.

In the meantime, societies at various levels have actively carried out activities to suggest ways and means for economic construction. The provincial medical, energy and other societies have offered more than 2,800 suggestions, of which 800 have been adopted.

Over the past 2 years, through international academic exchanges, the provincial Scientific and Technological Association and its subordinate societies have promoted their understanding of and friendship with foreign scientific and technical workers, broaden their field of vision, and mastered the world scientific and technological trends. This has played a positive role in promoting the province's scientific and technological progress and its economic development.

2. Corresponding with the urban and rural economic development, mass activities to popularize science have become invigorated.

To meet the urgent needs in the development of the commodity economy, and in the masses' efforts to learn and use science, scientific and technological associations at various levels have strengthened the work of popularizing science in rural areas with the emphasis on priorities, and have achieved substantial development in either its form or content, and in either its range or quality. The work has been extended from towns and cities to thousands of rural households, and has been developed from the propaganda and popularization of general scientific knowledge to the combination of popularizing scientific knowledge with popularizing practical technologies, conducting scientific and technological education, and rendering technical services. In this way, the development of rural intellectuals resources has been accelerated, the popularization and application of existing scientific and technological achievements have been promoted, and rural economic development has been facilitated.

Over the past few years, peasant-specialized technological research societies have mushroomed throughout the province. They are new-style mass organizations voluntarily established by the people, with the rural backbone technicians and skillful craftsmen as the main body. They have closely combined the propagation of scientific and technological knowledge and the popularization of practical technologies with the immediate and vital interests of peasants, and have promoted the combination of traditional technologies with modern science and technology, thus creating a pioneering work that enables the rural areas to move towards economic integration through technical cooperation. At present, the province has some 4,500 research societies for dozens of specialized trades including the cropping, breeding, farming, and processing industries. Through combining thousands of households and sending them technologies and information, these research societies have increasingly manifested their superiority and role in promoting technical progress in the rural areas. New headway has also been made in scientific and technological education and popularization in rural areas. Thus far, Shandong has established some 1,100 schools in townships and some 17,000 night schools in villages to popularize science and has held 70,000 short-term training classes through which some 5 million persons have been trained.

Meanwhile, progress has been made in urban scientific popularization.

3. Marked results have been achieved in scientific and technological consulting services for promoting economic construction,

Over the past few years, the scientific and technological consulting service initiated by scientific and technological associations has developed very quickly. Since 1984 when the provincial scientific and technological consulting service center was established, such consulting service organs have been set up one after another by scientific and technological associations in 13 cities and prefectures. Most of the county scientific and technological associations have assigned special persons for this work, and those societies which have conditions have also conducted technological consultations and technical service, thus initially forming a consultation service network. Statistics by part of the provincial-level societies and by various city and prefectural scientific and technological associations show that over the past

2 years, more than 5,000 technical consultation items have been completed, through which some 500 million yuan of economic results have been achieved.

Scientific and technological associations in Jinan, Zibo, Zaozhuang, Qingdao, Yantai, and some other counties and cities have sponsored technological markets. The provincial scientific and technological association has held a technological trade fair in cooperation with the provincial bureau in charge of town and township enterprises. In addition, Qingdao has sponsored a trade fair for ship communications and navigation technologies, the first of its kind in our country. These activities have accelerated the transfer of new technologies and promoted the rational flow of talent and the development of the local industry and township enterprises.

Supporting the poor by giving them scientific and technological service has been a new task of the scientific and technological mass organizations over the past few years. The provincial Civil Affairs Department and the provincial Scientific and Technological Association have jointly compiled a 10-volume series on supporting the poor through science and technology. Now these series have already been sent to the poverty-stricken villages and households. The groups for supporting the poor through science and technology organized by the provincial Scientific and Technological Committee and Association have scored achievements in giving support to seven counties in mountainous areas. The provincial Scientific and Technological Association has also sponsored an "exhibition on achievements in supporting the poverty-stricken rural areas to become prosperous through science and technology." The provincial textile and agricultural societies have organized pertinent specialists to go to the Yimeng mountainous area to conduct technical investigations, and then offered some specific suggestions for ending poverty and becoming prosperous.

4. New headway has been made in continued education for scientists and technicians and in scientific and technological activities for the young.

Scientific and technological associations and societies at all levels have run schools of various forms through various channels, and have striven to create conditions for knowledge renewal and further study of the in-service scientists and technicians. The provincial medical and railway societies have sponsored some 2,800 training classes of various kinds, through which more than 90,000 persons have been trained. The specialized technological study classes sponsored by the Jinan and Yantai scientific and technological night universities and by various cities and prefectures have been well received by the large number of scientists and technicians. The provincial scientific and technological center has sponsored some 400 classes on foreign terms in science and technology and on mechanical drawing, through which more than 20,000 persons have been trained. The Shandong Scientific and Technological Training Center has also run a secondary specialized class and a higher specialized class.

Launching scientific and technological activities among the youths and imparting rudimentary scientific and technological knowledge to the youngsters have strategic significance in training reserve scientific and technological talent. The provincial navigation and geology societies and scientific and

technological knowledge. At the national contests on minor inventions, minor theses, microcomputers, mathematics, and chemistry, the province has won 26 medals.

5. We have implemented the policy towards intellectuals, and given play to the role of scientific and technological associations.

Over the past few years the Zibo, Jinan, Liaocheng, and other city and prefectural scientific and technological associations as well as the pertinent provincial-level societies have conducted investigations on the situation of scientists and technicians in close combination with the implementation of policies towards intellectuals. The provincial scientific and technological association has conducted investigations among some 4,000 scientists and technicians on three occasions, and expeditiously reported their opinions, demands and voice to the provincial party committee, thus attracting the attention of the provincial party committee and the pertinent leading departments.

Practice adopted over the past 6 years has enabled us to further discern that the scientific and technological association as a mass community of science and technology under the party's leadership has become more and more important and had an important position in the program of building the socialist modernization. During the new historic period, efforts should be made to continuously create a new situation in scientific and technological work, and it is imperative to consciously uphold the four cardinal principles to earnestly implement the guidelines of scientific and technological work, and to vigorously serve economic and social development. Efforts should be made to resolutely rely on the leadership of the party and the government to strive for the support and assistance of the departments concerned, to earnestly implement the "double hundred" principle, to operate the associations in a democratic way by relying on the scientific and technological workers, to develop the work in line with the association's nature and characteristics, and to resolutely enhance organizational construction in order to continuously improve the association's organizational system and the conditions for serving the scientific and technological workers.

Future Tasks

Now we have entered 1987, the second year of the implementation period of the Seventh 5-Year Plan, in which we will all the more deepen the drive to conduct reforms. Major tasks for the years to come are as follows: Efforts should be made to unite or arouse the broad masses of scientific and technological workers throughout the province to make contributions to fulfilling the province's Seventh 5-Year Plan and the plan for building the socialist spiritual civilization, accelerating the pace of making the people wealthy and the province prosperous, and to greeting the overall growth of the economy in the 1990's.

1. Efforts should be made to extensively carry out academic exchanges to promote harmonious development between science and technology as well as the economy and society.

Strictly according to the province's major tasks in economic construction and scientific and technological development, we should organize various academic activities in a comprehensive way. Efforts should be made to enhance the combination between natural and social sciences and to pay attention to academic exchanges among basic, newly rising, crisscross, and marginal courses. We should continuously upgrade the quality of academic activities and successfully and vigorously managing academic periodicals.

Efforts should be made to enhance academic exchanges and cooperation with the neighboring provinces and cities, to strengthen contacts with the province's experts and scholars who are working in outside places, and to warmly welcome these experts and scholars to make contributions to their hometown's construction.

Efforts should be made to bring into full play the Shandong's condition of having coastal cities opening to the outside world and to further carry out international academic exchanges to promote friendly contact with foreign countries. The provincial-level societies should vigorously trace and introduce the international new achievements scored in science and technology and the managerial experience gained in the economy and administration, which has general adaptability. An emphasis should be put on enhancing the academic exchanges with the outside world in the scientific and technological associations of Qingdao and Yantai and efforts should be made to make best use of "windows" in introducing experts and technology in a selective manner.

2. Efforts should be made to vigorously popularize science and technology and to upgrade the scientific and technological quality of both the urban and rural people.

While enhancing scientific popularization in the urban areas, continuous efforts should be made to put the focus on scientific popularization on the rural areas. The scientific and technological associations and societies at all levels should actively coordinate the implementation of the "spark plan" and do a good job in grasping the following tasks by bearing in mind the "rural scientific popularization plan" put forth by the provincial scientific and technological association:

We should do a good job in continuously operating scientific popularization schools and opening short-term training classes on practical technologies to train 10 million key scientific and technological personnel for the rural areas.

By proceeding from reality, efforts should be made to popularize in a selective manner the new technology scored in the fields of planting, breeding, processing, service, and business management. We should adopt ways and means to provide technical and economic information for the rural areas and help peasants open new production avenues. Efforts should be made to consolidate or develop various specialized technological societies run by peasants and to further carry out the mass activities of technical and information exchanges and experiment and of creating something new.

Efforts should be made to spread scientific and technological knowledge and to adopt ways and means to upgrade the scientific quality of the people so that they can wage struggle against feudalism, superstitions, ignorance, and backwardness and serve the program of building socialist civilized cities, towns, and villages.

Efforts should be made to make use of the theory and method of the systematic sciences to probe the law of scientific popularization work in the rural areas and to further enhance scientific popularization work in the urban areas.

3. Efforts should be made to actively carry out scientific and technological advisory activities and technical service to promote economic development among the middle-sized and small enterprises, the poor areas, and areas with natural difficulties.

We should emphatically help the township enterprises do a better job in rendering services in management, technology, information, and markets to promote the activities of technological and personnel transfers. The provincial, city, and prefectural level societies and the scientific associations of industrial and mining enterprises should maintain long-term contacts with one or two small enterprises of the same trade to actively provide technical service for them. Within the next 5 years, they should provide 2,000 technical advisory items for helping the middle-sized and small enterprises adopt new technology, methods, materials, and equipment and increase their economic results and social benefits.

We should pay attention to giving play to the role of retired specialized technical personnel and technical workers and organize them to carry out various technical service activities. We should support and help scientific and technical personnel to contract, lease, or operate township enterprises and give support and encouragement to those research institutes and enterprises run by the local people which have achieved good economic results.

Scientific and technological associations at various levels should work out aid-the-poor plans, work in coordination with relevant departments to organize and send scientific and technical personnel to poverty-stricken units in mountainous and lake areas, in southwestern and northwestern Shandong and in the Huang He delta in a planned manner, and help them eliminate poverty, based on local standards, within 3 to 5 years. The provincial as well as city and prefectural scientific and technological associations should select some units to experiment with the work of assisting the poor through science and technology, sum up experiences, and extend it to other areas.

4. We should intensify the research and exchanges of the soft sciences in order to make our policymaking more democratic and scientific.

Scientific and technological associations at various levels and their subordinate organizations should make full use of their advantages of having wide lateral ties and intensive knowledge of multiple disciplines to establish policymaking consulting service organizations at various levels which

cover various fields of sciences, actively carry out academic activities on soft sciences, and perform their function as a brain trust in helping in the policymaking of leading personnel.

Proceeding from Shandong's actual situation, we should organize scientific and technical workers to cooperate with the masses, through various channels, in their rich practice of creative new lives; to apply scientific theories and methods to participate in the research and exploration on the strategies for scientific and technological, economic and social development in such areas as agriculture, energy, communications, science and technology, education, economic structure, and urban and rural construction; and to provide scientific data for the policymaking of leading persons from the macroeconomic point of view through technological investigations, appraisals and services in major projects of economic development planning, technical transformation, and technology imports.

5. We should develop intellectual resources to facilitate the growth and improvement of talented scientific and technical personnel.

Scientific and technological associations at various levels and societies should actively create favorable conditions and adopt various measures to help scientific and technical personnel replenish new knowledge. The provincial scientific and technological training center as well as city and prefectural scientific and technological institutes for advanced study should be turned into bastions for the continued education of scientific and technical personnel.

Scientific and technological associations at various levels should discover and cultivate talented people through various activities, and should especially create favorable conditions for outstanding young and middle-aged ones to develop their talents. They should give wide publicity to the functions and deeds of talented scientific and technical personnel and recommend outstanding ones to relevant departments. They should pay attention to giving play to the role of veteran experts, and encourage them to make contributions to training and supporting outstanding personnel.

We should attach great importance to the scientific and technological education of youngsters, combine the popularization of scientific and technological knowledge with the cultivation of the scientific spirit and creative ability of youngsters, and combine scientific and technological activities with the education in lofty ideals so as to promote the healthy growth of scientific and technical forces.

As pioneers of the material civilization and builders of the spiritual civilization, scientific and technical workers should not only work as well-educated and self-disciplined citizens with lofty ideals and moral integrity when carrying out their various tasks but also stand at the fore of the trend of the times, take the initiative in building the spiritual civilization, carry forward the scientific morality with "devotion, creation, realistic approach, and cooperation" as its major content, and foster new practice in the scientific and technological circles.

Improve Scientific and Technological Associations Through Reform

To fulfill the arduous tasks entrusted by the new period, scientific and technological associations at various levels throughout the province should actively blaze new trails in the course of reform, improve themselves, arouse their spirit, work hard and strive to turn themselves successfully into "hones for scientific and technical workers." For this purpose, we should 1) further consolidate and perfect all the organizations of scientific and technological associations; 2) rely on scientific and technical workers to exercise democratic management; 3) respond to the desires of scientific and technical workers and safeguard their legal rights and interests, and 4) strengthen the organs of scientific and technological associations, and improve their work efficiency and services.

Delegates, comrades, the party and the people place ardent expectations on the masses of scientific and technical workers. Under the leadership of the provincial party committee and government, we should work together, plunge into reform, and open up a splendid future for fulfilling our province's Seventh 5-Year Plan and the plan for building the socialist spiritual civilization, and for making the people affluent and Shandong prosperous.

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CSO: 4008/2088

NATIONAL DEVELOPMENTS

SHANXI MEETING ON S&T REFORM

HK040549 Taiyuan Shanxi Provincial Service in Mandarin 2300 GMT 2 Mar 87

[Text] During a provincial conference on scientific and technological work, which opened yesterday, Wu Dacai, member of the Standing Committee of the Provincial Party Committee and chairman of the Provincial Scientific and Technological Commission, noted: The major tasks of our province's scientific and technological work in 1987 are: to deepen the reform, to revitalize scientific research organizations and scientific and technical personnel, and to promote a close integration of the S&T development and economic development. He said: To make sure that these tasks are successfully carried out, this year we must promote work in the following five aspects:

First, we must continue to deepen the reform of the system of allocating funds within scientific research organizations at the provincial level. Operating expenses in work quotas must be reduced by 20 percent which is to be used as circulating funds for scientific research work in research institutes so as to strengthen the vitality of research institutes. Starting this year, scientific research organizations at the prefectural and city levels must comprehensively implement the classified management of scientific research funds. In carrying out the reform of county-level scientific and technological systems, we should put the stress on revitalizing scientific and technical personnel and encourage them to reinvigorate local economies through various forms such as contracting, leasing, and establishing units. County-level scientific research units must be the first to set examples of contracting projects, leasing county-level scientific and technological organizations, and actively and extensively popularizing technologies and promoting technological services.

Second, we must do a better job of extensively promoting a close integration of scientific research and production, encourage scientific research organizations and enterprises to form various types of integrated groups, gradually reduce scientific research units' dependence on state appropriations, put the stress on the promotion of a lateral integration of scientific research and production, establish the interdependent relations between scientific research units and enterprises, gradually turn enterprises into the source of funds for the development of scientific research, and gradually draw such funds from gross sales.

Third, departments at all levels must encourage scientific research organizations, universities and colleges, and large and medium-sized enterprises to actively carry out technological business activities and to set up all kinds of independent or dependent, governmental or nongovernmental technological business organs and technological consultant organs. We must encourage scientific and technical personnel to establish all kinds of technological businesses in society, fully mobilize their enthusiasm, and popularize all our currently advanced and applicable technologies among production units, medium-sized and small enterprises, and enterprises in townships and towns.

Fourth, a revitalizing scientific and technical personnel, all scientific and technological departments, all departments responsible for supervising scientific and technical cadres, and all units with relatively intensive concentration of qualified personnel must send in an organized way a number of scientific and technical personnel to help medium-sized and small enterprises and enterprises of townships and town with their work on a short-term, or indefinite or rotational basis, and assist such enterprises in raising technological standards and improving management and product quality. We must also allow scientific and technical personnel to become rich while creating wealth for our society.

Fifth, to further expand the decision-making power of research institutes, we must gradually carry out in scientific research units the reform of separation of ownership and power over funds. This year county-level scientific and technological organizations can go in for contracting and leasing work. However, scientific and technological organizations at and above the prefectural and city levels should first experiment in this regard. As for those research institutes, implement the complete rationing system for technological development, responsible departments must adopt measures to encourage such institutes to gradually enter the transitional stage of the reform of technological contractual system.

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CSO: 4008/2088

NATIONAL DEVELOPMENTS

SSTC, MOF ISSUE SCIENCE MANAGEMENT FUNDING REGULATIONS

OW230508 Beijing XINHUA Domestic Service in Chinese 0252 GMT 21 Mar 87

[Text] Beijing, 21 Mar (XINHUA)—The State Scientific and Technological Commission and the Ministry of Finance recently issued the Provisional Regulations on the Control of Management Funds for Scientific Undertakings. The regulations are to supplement the provisional Regulations on the Control of Appropriations for Scientific Undertakings, issued last February by the State Council.

According to the regulations, independent scientific research units, based on their specific scientific activities, fall into the following categories: Technology Development Type, Basic Research Type, Social and Public Interests Research Type, and Multi-Disciplinary Research Type; and they will be subject to control of management funds accordingly. Scientific research units engaging in technological research and expecting to yield practical value within a short time belong to the Technology Development Type. They should adopt a technological contracting system in fund management. Those units engaging in basic research that does not produce immediate practical value, belong to the Basic Research Type. They should adopt the foundation system in the management of funds. Units involved in research of social and public interests should, in principle, adopt the funds contracting system. Scientific research units engaging in multi-disciplinary research should try various methods to seek funding.

The same accounting calculation applies both to scientific funds and various categories of income of scientific research units.

Scientific research units falling under the category of Technology Development Type should practice partial budget management. For units with independent funding, the state will continue contributing subsidies to pay for their retired personnel. As for the units still depending on the government for funding, the state will gradually decrease and eventually phase out funding for scientific research during the 7th Five-Year Plan. Technology development scientific research units should seek their own management funds through incomes from technological contracts, or acquire them by creating economic benefits for society.

Scientific research units falling under the category of Basic Research Type should practice full budget management. They should try to acquire their research funds mainly through various foundations. The state will only contribute a certain amount of operational funds and funds for the upkeep of premises. Some funds for scientific research should be used for natural science research. As for income earned legitimately, basic research scientific units can retain them for their own use.

The state will allocate funds for scientific research to scientific research units falling under the category of Social and Public Interests Research Type. Units can retain all their net income if it does not exceed 10 percent of the funds being allocated; half of the excess portion will be used as allocation funds in the next fiscal year and the units may keep the other half. Technology commercialization should be encouraged and promoted at social and public interest research units. They should adopt the fund management method being practices at technology developmental scientific research units.

As for the fund management of scientific research units falling under the category of Multi-Disciplinary Research Type, they should either follow the methods adopted by the Technology Development Type or Basic Research Type research units, according to the category of scientific activities in which they engage.

Two-thirds of scientific research funds left over by Technology Development Type or Multi-Disciplinary Research Type research units will go to higher-level departments for use in perfecting technical work and for the state's major scientific and technological projects; one-third will be turned over to the State Scientific and Technological Commission to be used as capital for national scientific and technological loans and credits. Competent departments will use leftover operation funds of technological foundations for technological development. The State Education Commission and the Chinese Academy of Sciences can use one-third of the funds intended for the State Scientific and Technological Commission as expenses to cover nationwide experimental projects.

As long as they can fulfill the state's assigned task, scientific research units of all categories can acquire technological income through such scientific and technological activities as technological transfers, consultation, services, training, contracting, exports, technological joint management, promotion of scientific results, and scientific experiments. They can also acquire legitimate income from small-scale production and business operations related to scientific and technological development. This will serve to reinforce the capability of scientific research units for self-development, and the vitality to actively serve economic construction.

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CSO: 4008/2088

NATIONAL DEVELOPMENTS

GOOD USE MADE OF TECHNOLOGY IMPORTED DURING 6TH FYP

Beijing KEJI RIBAO in Chinese 20 Mar 87 p 1

[Article: 60 Percent of Technology Items Imported During Later Stages of 6th FYP Have Gone Into Production; We Will Implement the Three Transformations to Accelerate Assimilation"]

[Text] According to a relevant department of the State Economic Commission, by the end of 1986, more than 60 percent of the 3,000 items of advanced technology that the State Economic Commission was responsible for importing during the last three years of the 6th FYP had been put into production and most of the remaining items will be put into production by the end of 1987.

These "3,000 items" are an integral component of China's open door policy. These items require little investment, have a short period of construction, produce quick results and turn a decent profit. For example, the more than 500 items of technology imported by the (former) Ministry of Machine Building Industry involved more than 6,000 types of products, and this will allow 10 percent of the relevant departments' products to achieve a technological level of the late 1970s or 1980s. More than 30 percent of the products of the electronics industry have attained a technological level of the late 1970s or 1980s. By importing technology, 20 percent of Beijing Municipality's enterprises transformed. We have learned from technology that has been put into production that 2 yuan in output and 0.4 yuan in profit are realized every year for every 1 yuan invested. Enterprises that have been transformed with this advanced technical equipment will become a main force in the nation's economic development.

Because technology imports are in the exploratory stage, there are also a few problems that exist in actual experience. The main problem is that we have focused on macro-control too late: there is duplicate imports of some items; and sometimes we are too bullish about foreign things. In addition, people do not have a sufficient understanding of the difficulties involved in absorbing and assimilating, and policies and measures have no basis. Faced with these problems, we are strengthening the macro-guidance of industry's authorized departments, we are working out coordination between industry plans and development projects, and are setting up consulting and information services for technology imports. We are also gradually establishing legislative work, strengthening the regulatory role of economic levers, and providing the necessary administrative interference.

Under the guiding ideology of technology imports, we must gradually realize the "three changes;" i.e., a change from primarily importing production lines and key equipment to primarily importing software technology and the necessary

key equipment, as well as strict controls on the import of electric equipment that we are capable of producing domestically; a change from imports by enterprises alone to cooperative imports by scientific research and production units, so as to raise the starting point of technical imports; and a change from an emphasis on production to an emphasis on digestion and absorption, so as to accelerate the pace at which products become Chinese.

CSO: 4008/2091

NATIONAL DEVELOPMENTS

NEW ADVANCE IN SUPERCONDUCTOR RESEARCH

OW191819 Beijing XINHUA in English 1544 GMT 19 Mar 87

[Text] Hefei, 19 Mar (XINHUA)--Researchers at the Chinese University of Science and Technology have greatly improved their newly developed superconductor, university officials announced today.

The new superconductor has a temperature from linear at 215° K (minus 73° centigrade), up from 130° K (minus 143° centigrade) obtained by them on 9 March.

Repeated tests showed that the figure was "reliable" and the property of sample materials, "stable," the official said.

Manufactured by a research group headed by Professors Zhang Qirui and Qian Yitai, and lecturer Chen Zuyao, the superconductor is composed of barium, yttrium, copper and oxygen.

Its critical temperature midpoint is 93° K (minus 180° centigrade) and resistance approached zero at the point of 91° K (minus 182° centigrade).

Now more than 50 scientists at the university are engaged in the research.

"We want to obtain a superconductor with critical temperature onset at more than 300° K (27° centigrade)," Zhang said.

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CSO: 4010/13

NATIONAL DEVELOPMENTS

STATE COUNCIL CALLS FOR COOPERATION BETWEEN RESEARCH, PRODUCTION

OW241205 Beijing XINHUA in English 1053 GMT 24 Mar 87

[Text] Beijing, 24 Mar (XINHUA)--Multi-faceted cooperation in science, design and production to boost technology and product development will become an integral part of China's reform.

After recent studies, four commissions and an office affiliated with the State Council, made this proposal. The surveys also show many research institutes are already working with large enterprises to develop new technology, set up joint companies and expand cooperation with small local industrial businesses.

"Science is sometimes considered a separate field from economics, because some people, including government officials, are bound by tradition and have limited experience with this type of cooperation, especially on the trans-regional level," the related departments said, adding policies ensuring this type of cooperation have not been adequately formulated.

Departments concerned agree, "boosting commodity production to create competition and a buyer's market is the basic way to solve the country's economic problems, and to do so government departments should support cooperation between scientific research institutions and production-related enterprises."

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CSO: 4010/13

NATIONAL DEVELOPMENTS

LABORATORY TEST OF STAINLESS STEEL SUCCESSFUL

OW241248 Beijing XINHUA in English 1225 GMT 24 Mar 87

[Text] Shenyang, 24 Mar (XINHUA)--Chinese experts have succeeded in a laboratory test of producing ultra-low-carbon stainless steel directly from a high quality iron ore concentrate.

The steel, produced from a vacuum induction furnace, meets international standards, according to officials at the Benxi Iron and Steel Company in Liaoning Province.

Experts from the Benxi Iron and Steel Institute and elsewhere began the research last year, and in producing the steel, they used concentrate of iron ore from the Nanfen Opencast Iron Mine attached to the company as material.

The Nanfen iron ore is known to metallurgy experts as the "ginseng ore"--meaning that it is an extremely valuable variety, the officials said, adding that the concentrate used has an iron content of 70 percent.

If the technique is used in commercial production, the cost of producing the steel could be 40 percent lower than the price of importing it.

That means for 1,000 tons of steel produced, US\$20 million could be saved, the officials added.

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CSO: 5010/13

NATIONAL DEVELOPMENTS

FIRM EXPORTS NEODYMIUM-IRON-BORON MAGNETIC PRODUCTS

OW181207 Beijing XINHUA in English 1137 GMT 18 Mar 87

[Text] Beijing, 18 Mar (XINHUA)--A company under the Chinese Academy of Sciences has recently exported 1 million yuan worth of neodymium-iron-boron magnets, making China one of the few producers and suppliers of this rare and recently discovered magnet material in the world.

Neodymium permanent magnet materials is the latest development in high energy magnets and is the most cost effective high energy magnet on the market today. It was first discovered in 1983.

The United States and Japan have invested millions of dollars in developing the material. The European Economic Community is organizing 53 laboratories in 12 nations to carry out research. Western experts expected that by the early 1990's, neodymium permanent magnets will capture 50 percent of the magnet market. Commercial application of the material is increasing. The magnets are being used by manufacturers of motors, telecommunications and computer equipment, acoustic devices, consumer durables and other products.

The Sanhuan Corporation for Research and Development of New Materials, under the Chinese Academy of Sciences, successfully developed a low-grade magnet of this type. "This greatly reduced the cost of raw materials and our technology was also a breakthrough," said Wang Zhenxi, president of the corporation.

China has 90 percent of the known reserves of the materials used in producing these new magnets. China has been an only supplier of the raw materials to foreign countries.

The Sanhuan corporation has developed a variety of neodymium magnet alloys and is beginning large-scale commercial production. "Entering our products in the world's market will have a significant impact on establishing a high-tech industry in this field in China," Wang said.

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CSO: 4010/37

NATIONAL DEVELOPMENTS

PHYSICISTS EXPAND RESEARCH IN 'SUPER STRING' THEORY

OW201224 Beijing XINHUA in English 1044 GMT 20 Mar 87

[Text] Beijing, 20 Mar (XINHUA)--Chinese physicists are doing more research in particle physics, according to Professor Song Xingchang, deputy academic chairman of the Institute for Theoretical Physics under the Chinese Academy of Sciences.

The focus of the current research is the "super string" theory, based on the "grand unification" hypothesis which isolates four fundamental forces in nature: weak interaction, strong interaction, electromagnetic force, and gravity. According to the hypothesis, these four forces unite to stabilize the universe.

Scientists have experimentally proved the unification of weak interaction and electromagnetic force, and theoretically proven strong interaction is also part of the process.

For years, attempts to verify the position of gravity in this "grand unification" have all failed. The "super string" theory is now considered the only explanation for nature's unification of these four forces, and currently half the world's particle physicists are engaged in the research.

Over the past 3 months, Professors Song Xingchang and Guo Hanying from the institute, affiliated with China's Academy of Sciences, organized a dozen physicists and mathematicians from Beijing University, Qinghua University, and other institutes to challenge the problem. Working day and night on the basic theories, the group is trying to formalize the "super string" theory. To date, they have published six articles, and they believe, "even if our theories cannot be proved in the lab at present, the data from our research is significant for further study."

The institute will sponsor an international workshop on the "super string" theory scheduled for July in Beijing to promote more of this type of research in China.

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CSO: 4010/37

NATIONAL DEVELOPMENTS

BRIEFS

CHINA OPTICS ASSOCIATION--Beijing, 24 Jan (XINHUA)--With the approval of the State Economic Commission, the China Optics Association was inaugurated in Beijing on 23 January. Its nearly 400 members include enterprises, scientific research units, and educational institutes in over 50 departments and regions across the country. Currently, the association has gathered over 90 percent of the nation's optical research and production force, and will devote itself to developing new optical and photoelectronic products and improving production efficiency and quality. Noted optical specialist Wang Daheng was elected president of the association. Yan Jici, vice chairman of the NPC Standing Committee, and leaders concerned of various ministries and commissions attended the inaugural ceremony of the association. [Summary] [Beijing XINHUA Domestic Service in Chinese 0818 GMT 24 Jan 87 OW] /9274

SICHUAN SPARK PLAN PROJECTS--About half of the province's 368 spark plan projects for the 1986/1987 year were completed or achieved initial results last year, thus increasing the province's income by 120 million yuan, which exceeded the amount of funds invested in these projects the same year. After the completion of these spark plan projects this year, the province's income will increase by about 700 million yuan, nearly 10 times the funds invested in these projects. [Summary] [Chengdu Sichuan Provincial Service in Mandarin 2300 GMT 25 Feb 87 HK] /9274

PUBLICATION OF S&T INSTITUTES DIRECTORY--Beijing, 24 Mar (XINHUA)--China will soon publish a book on its 6,000 science and technology research and development institutions. The six-million-word catalog will include the names, addresses, areas of research, specialized fields, major achievements, patented inventions, consultation services and available technology of these institutions. [Text] [Beijing XINHUA in English 1528 GMT 24 Mar 87 OW] /9274

CSO: 4010/13

APPLIED SCIENCES

MODEL OF MEDICAL DIAGNOSIS EXPERT SYSTEM

Shenzhen SHENZHEN DAXUE XUEBAO (LIGONG BAN) [JOURNAL OF SHENZHEN UNIVERSITY (SCIENCE AND ENGINEERING)] in Chinese Vol 3 No 2, Jun 86 pp 73-76

[English abstract of article by Zhou Jingzhou [0719 2529 3166]]

[Text] This paper presents a model of a medical diagnosis expert system in which a production system structure is used. Its knowledge base consists of two parts: the general knowledge of diseases and specific knowledge of the patient. The system operates in a backward deduction way, calculates the certainty factor in the process of reasoning, and then draws the diagnosis conclusion. (Paper received March 1986.)

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CSO: 4009/1064

MICROCOMPUTER LOCAL-NETWORK HOTEL MANAGEMENT SYSTEM

Shenzhen SHENZHEN DAXUE XUEBAO (LIGONG BAN) [JOURNAL OF SHENZHEN UNIVERSITY (SCIENCE AND ENGINEERING)] in Chinese Vol 3 No 2, Jun 86 pp 77-85

[English abstract of article by Jin Guofen [6855 0948 5358], et al.]

[Text] This paper describes a microcomputer local-network hotel management system which is now operating at the Xiyuan Hotel, Beijing. The NESTAR (PLAN4000) local network system, the first of its kind employed in China, links the 16 departments and 20 service stations of the hotel and brings about the computerization of the front office management. This paper also presents a detailed account of the system, including the configuration, special features and function block diagrams of the respective modules. (Paper received March 1986.)

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CSO: 4009/1080

INVESTIGATION OF PERFORMANCE OF SMALL-DIAMETER HIGH-STRENGTH FRICTION BOLTS
AND BOLTED FRICTION JOINTS OF COLD-BENT THIN STEEL PLATES

Shenzhen SHENZHEN DAXUE XUEBAO (LIGONG BAN) [JOURNAL OF SHENZHEN UNIVERSITY
(SCIENCE AND ENGINEERING)] in Chinese Vol 3 No 3, Sep 86 pp 1-13

[English abstract of article by Yu Pingjing [6657 1627 7234]]

[Text] Based on engineering application and systematic experimental study, the author puts forward the special features of bolted friction joints of cold-bent steel plates using small-diameter high-strength friction bolts. This is a new topic of study in China in the field of steel structure. The author has measured the basic parameters necessary to the design and presents the method of computation. In this way, the paper renders a scientific basis for extending China's "Design Standards for Cold-bent Thin-plate Steel Structure" to include bolted friction joints. (Paper received March 1986.)

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OPTICAL DISC STORAGE TECHNOLOGY

Shenzhen SHENZHEN DAXUE XUEBAO (LIGONG BAN) [JOURNAL OF SHENZHEN UNIVERSITY (SCIENCE AND ENGINEERING)] in Chinese Vol 3 No 3, Sep 86 pp 57-95

[English abstract of article by Zhu Qiye [2612 0120 2814], et al.]

[Text] Optical disc storage is a new technology developed in recent years. This paper is a review of the principles, characteristics and application of the optical disc storage technology and material for optical discs as well as optical disc storage systems for computers. (Paper received June 1986.)

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COMPLEX METHOD CAPABLE OF TREATING EQUALITY CONSTRAINTS

Shenzhen SHENZHEN DAXUE XUEBAO (LIGONG BAN) [JOURNAL OF SHENZHEN UNIVERSITY (SCIENCE AND ENGINEERING)] in Chinese Vol 3 No 1, Mar 87 pp 76-85

[English abstract of article by Wu Jingu [0702 0093 6253]]

[Text] This paper advances a new algorithm which, by utilizing the characteristics of the conventional complex method, transforms the general nonlinear programming containing both equality constraints and inequality constraints into a nonlinear programming containing only inequality constraints, suitable for the algorithm of the complex method. The new algorithm, together with the conventional algorithm of the complex method, constitutes a complete algorithm. This algorithm has been proven practicable by trial runs of its program. (Paper received Jan 86.)

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DESIGN AND CONSTRUCTION OF 2-8.4 GHz WIDE BAND FREQUENCY MULTIPLIER

Shenzhen SHENZHEN DAXUE XUEBAO (LIGONG BAN) [JOURNAL OF SHENZHEN UNIVERSITY (SCIENCE AND ENGINEERING)] in Chinese Vol 3 No 1, Mar 87 pp 94-101

[English abstract of article by Ruan Yongsheng [7086 3057 4141]]

[Text] This paper describes the design and construction of a YIG pass-band filter which is used for a 2-8.4 GHz wide band frequency multiplier. The pass-band performance of the filter varies with the frequency of the output signal by changing the exciting current/voltage and employing the wide-band characteristic of the filter. In addition to selecting the frequency-doubling signal, the filter picks up the input signal to broaden its frequency band. Measurements show that the fluctuation of output power over the whole band is moderated even though the power loss of the input signal reaches 6 dB. (Paper received Dec 85.)

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HOLE SUBBANDS IN $\text{GaAs-Al}_x\text{Ga}_{1-x}\text{As}$ SUPERLATTICE

Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTORS] in Chinese Vol 8 No 1, Jan 87 pp 1-10

[English abstract of article by Tang Hui [3282 5610], et al., of the Institute of Semiconductors, Chinese Academy of Sciences]

[Text] Hole subbands in $\text{GaAs-Al}_x\text{Ga}_{1-x}\text{As}$ quantum wells and superlattices are calculated based on the Luttinger-Kohn effective mass theory. The method of calculation parallels usual pseudopotential energy band calculations in terms of plane wave basis functions. In the present case, the usual heavy and light hole solutions of the L-K equations constitute the basic functions, with a Kronig-Penney type effective superlattice potential taking the place of the atomic pseudopotentials. Because there is only one dimensional periodicity in the present case, despite the four-fold basis functions, a very limited number of reciprocal lattice vectors need be used to obtain reasonable accuracy. Typical calculated subband dispersion curves $E(k)$ and hole wave functions are given. Various features of hole subbands, such as anisotropy and nonparabolicity, intermixing of heavy and light holes, interdependence between two-dimensional subband and perpendicular motion, interwell coupling effects, etc., are discussed. (Paper received 2 Jul 85.)

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RESEARCH ON CHARACTERISTICS OF AMORPHOUS SILICON-TIN ALLOY

Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTORS] in Chinese Vol 8
No 1, Jan 87 pp 20-25

[English abstract of article by Li Changjian [2621 7022 0256], et al., of the
Department of Electronic Science, Nankai University]

[Text] A new type of amorphous silicon-tin alloy has been deposited by the GD technique using SiH_4 and SnCl_4 mixture. The optical gap and photoconductivity of the a-SiSn (Cl, H) alloy decrease monotonically with an increase of Sn content in the films and the predominant conduction mechanism changes from N to P type. As the optical gap decreases the activation energy increases at the initial state and then decreases, the room temperature dark conductivity decreases at first and then increases steadily.

The authors have doped a quantity of phosphor for compensation into a-SiSn (Cl, H) alloy. As the P concentration increases to a suitable quantity, the photoconductivity of the alloy enhances two to three orders of magnitude and the conduction mechanism changes from a P to N type.

The low absorption coefficient region of the a-SiSn(Cl, H) films has been measured by the constant photocurrent method, and the results are discussed.
(Paper received 16 Sep 85.)

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TEMPERATURE DEPENDENCE OF LVM ABSORPTION INDUCED BY CARBON IN GaAs

Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTORS] in Chinese Vol 8
No 1, Jan 87 pp 33-42

[English abstract of article by Jiang Desheng [3068 1795 3932], et al., of
the Institute of Semiconductors, Chinese Academy of Sciences]

[Text] A substituted carbon atom on the As site in a GaAs lattice induces LVM absorption near 582 cm^{-1} at low temperatures. Due to the extreme sharpness of split absorption lines caused by the isotope effect of the nearest-neighbor Ga atoms ($\sim 0.1\text{ cm}^{-1}$ at 25K), the temperature dependencies of the frequency and half width of a particular spectral line are accurately determined. It is shown that the anharmonic coupling between LVM and the lattice phonons plays a significant role in frequency shift and line broadening, although such an effect is relatively weak when compared to the similar one in alkali halides and other strongly ionic crystals.

In P-type and semi-insulating GaAs samples, the integrated absorption near 582 cm^{-1} induced by C_{As} LVM is observed to decrease with reduced temperatures. This phenomenon can be explained by the variation of concentration of negatively charged C_{As} with temperature, indicating the deionization process of carbon acceptor centers which occurs at low temperatures. (Paper received 8 Oct 85.)

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EFFECTS OF ENERGYBAND STRUCTURE ON OPTICAL GAIN SPECTRA OF InGaAsP QUATERNARY SEMICONDUCTOR

Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTORS] in Chinese Vol 8 No 1, Jan 87 pp 49-60

[English abstract of article by Guo Changzhi [6753 7022 1807], et al., of the Department of Physics, Beijing University]

[Text] The effects of energyband structure on the optical gain spectra of InGaAsP quaternary semiconductors under various dopings, injection levels and temperatures have been studied theoretically. The calculated results using five different models have been carefully compared with recent experimental data. It is shown that, especially near room temperature, the optical transition matrix elements play a more important role than the energyband state density functions, and the main optical transition process obeys the k-selection rule. Several approximate formulas fitting the calculated gain spectra are also proposed for application. (Paper received 14 Oct 85.)

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X α -SW INVESTIGATIONS OF DEEP LEVELS IN Si:Pd

Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTORS] in Chinese Vol 8
No 1, Jan 87 pp 67-75

[English abstract of article by Tang Jiuyao [0781 0046 5069], et al., of the Department of Physics, Zhejiang University; Huang Qi [7806 4860], et al., of the Institute of Physics, Chinese Academy of Sciences; Wu Jitan [0702 3078 1344] of the Institute of Semiconductors, Chinese Academy of Sciences]

[Text] The electronic structures of PdSi₁₀H₁₆ and PdSi₄H₁₂ clusters modeling interstitial and substitutional Si:Pd have been calculated respectively, using spin-restricted X α -SW method. The results show: (1) the two donor-type deep levels in Si:Pd recently discovered by Ruan, et al., might not have simply originated from the interstitial Pd in silicon, but are also related to the existence of other defects; and (2) a Jahn-Teller type of distortion should exist in the substitutional Si:Pd system. The distortion is probably similar to the case of the vacancy acceptor center in silicon in which the Td $\rightarrow$ D_{2d} $\rightarrow$ C_{2v} symmetry-lowering has been undergone. This is in agreement with the Si:Pd⁻ acceptor center geometry model proposed by Woodbury, et al., based on their EPR experiment. (Paper received 4 Nov 85.)

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STRIPE GEOMETRY AND PERFORMANCE OF HIGH SPEED GaAlAs/GaAs EDGE-EMITTING LED WITH ASYMMETRICAL WAVEGUIDE

Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTORS] in Chinese Vol 8 No 1, Jan 87 pp 76-83

[English abstract of article by Wang Dening [3769 1795 1337], et al., of Shanghai Institute of Metallurgy, Chinese Academy of Sciences; Wu Chenzhou [0702 7115 0719] of Shanghai Telecommunication Equipment Factory, Postal and Telecommunication Ministry]

[Text] The effects of stripe geometry on the performances of high speed GaAsAs/GaAs edge-emitting LED with an asymmetrical waveguide are described. By calculating the efficiency ϵ of the light extraction and of the light output power from the LED, the authors discuss the relationships among the structure parameters of the "five-layer-structure" LED with an asymmetrical waveguide. The authors also calculate lateral current spreading and optical field distribution of the LED under different strip widths. The results calculated are in good agreement with those found by experiments. By reasonable option, edge-emitting LEDs with good performances are obtained at a driving current of 100 mA. The output power at the end of a fiber pigtail (core diameter of fiber = 50 μm and numerical aperture $N_A = 0.2$) is 60-200 μW (max 220 μW) and the cut-frequency is greater than 60 MHz (3 dB) (max 100 MHz). The LEDs are good source devices for an optical fiber communication system with a data rate of 34 Mb/s and for a high speed analog transmitting system. (Paper received 19 Nov 85.)

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ELECTRON RADIATION EFFECTS OF GaAs MESFET

Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTORS] in Chinese Vol 8
No 1, Jan 87 pp 84-89

[English abstract of article by Wu Fengmei [0702 7685 5019], et al., of the
Department of Physics, Nanjing University; Gong Bangrui [7895 6721 3843] of
Nanjing Solid State Devices Research Institute]

[Text] The radiation effects of 12 MeV electron irradiated GaAs MESFET are investigated. Electron traps with levels of E_1' ($E_C-0.38$ eV), E_2' ($E_C-0.57$ eV) and E_3' ($E_C-0.74$ eV) have been found in the VPE n-GaAs active layer after irradiation. The results indicate that the changes in the GaAs MESFET parameters are due mainly to the carrier removal. The calculated carrier removal rate in devices ranges from 8 cm^{-1} to 30 cm^{-1} , and the mobility damage constant is smaller, in the order of about 10^{-17} cm^2 at room temperature. (Paper received 21 Nov 85.)

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JUDGE OF OHMIC CONTACT TO PLANAR DEVICES--CIRCULAR TRANSMISSION LINE MODEL EXTRAPOLATION

Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTORS] in Chinese Vol 8
No 1, Jan 87 pp 102-108

[English abstract of article by Chen Cunli [7115 1317 4409], et al., of the
Department of Physics, Nanjing University]

[Text] A new method--circular transmission line model extrapolation--for
judging ohmic contact of planar devices is described. The mesa isolation of
the sample test configuration is not necessary as only one time metallization
is needed. The equations for measuring specific contact resistance ρ_c have
been derived by the circular transmission line model, and have also been
verified by experiments in Si and GaAs. The results are in good agreement
with the on-line geometry transmission line model. The effects of the dif-
ference in the sheet resistance of the semiconductor layer directly under the
contact and the sheet resistance of the layer outside the contact region are
discussed. (Paper received 12 Sep 85.)

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SHOCK EMBEDDING DISCONTINUOUS SOLUTION OF ELLIPTIC EQUATION FOR INVERSE
PROBLEM OF TRANSONIC S_2 FLOW

Beijing GONGCHENG REWULI XUEBAO [JOURNAL OF ENGINEERING THERMOPHYSICS]
in Chinese Vol 8 No 1, Feb 87 pp 23-30

[English abstract of article by Chen Hongji [7115 1347 0370], et al., of the
Institute of Engineering Thermophysics, Chinese Academy of Sciences]

[Text] The governing equation is elliptic when the meridional velocity of the flow in a turbomachine is subsonic. Fully on a theoretical basis, through finding a proper conservative form of equation of motion, the shock relations are embedded into the stream function principal equation, and a numerical method which can give a discontinuous solution is presented. The algorithm is simple and reliable due to its elliptic nature. The computer code employing this method has been programmed and has been used to calculate an example. It can be applied to the iteration with "separate-region calculation with shock fitting" of S_1 flows to obtain transonic three-dimensional flow in a turbomachine.

NUMERICAL SOLUTION OF BOUNDARY LAYER DIFFERENTIAL EQUATIONS FOR CASCADES ON
STREAM SURFACE OF REVOLUTION

Beijing GONGCHENG REWULI XUEBAO [JOURNAL OF ENGINEERING THERMOPHYSICS]
in Chinese Vol 8 No 1, Feb 87 pp 39-45

[English abstract of article by Chen Naixing [7115 0035 5281] of the Institute
of Engineering Thermophysics, Chinese Academy of Sciences]

[Text] This paper is the continuation of a previous one. On the basis of the governing equations of viscous flow expressed by the non-orthogonal coordinate system and the magnitude analysis of its terms, the boundary layer equation taking into consideration thickness variation of the stream sheet of revolution is presented. Using a compressibility coordinate transformation, a set of first derivative differential equations has been derived. Introducing a factor, K , for considering the pressure gradient along the stream surface, the accuracy of computation can be increased. The difference equations are obtained by the "Box" method and solved by Newton's method. Computer codes, TDBLC (for adiabatic wall) and HTBLC (for the given wall temperature distribution) are used for the present calculations. Comparison between calculations and experiments shows that the present method can be used for computing the laminar and turbulent boundary layers of the cascades on the stream surface of revolution.

EXPERIMENTAL INVESTIGATION OF COMBUSTION PERFORMANCE FOR COAL SLURRY

Beijing GONGCHENG REWULI XUEBAO [JOURNAL OF ENGINEERING THERMOPHYSICS]
in Chinese Vol 8 No 1, Feb 87 pp 87-90

[English abstract of article by Huang Zhaoxiang [7806 0340 4382], et al., of
the Institute of Engineering Thermophysics, Chinese Academy of Sciences]

[Text] Experimental investigations of combustion performance for COM, CMM
and CWM in stagnant and convective flow environments have been carried out
with a precision thermobalance and high temperature gas experimental device.
Combustion histories of different kinds of coal slurry are researched and
compared. Ignition of coal slurry is discussed. Photo pictures and LASER
interferometer pictures show the history of coal slurry droplet burning.

ON SCALING LAWS FOR BUBBLING GAS-FLUIDIZED BED DYNAMICS

Beijing GONGCHENG REWULI XUEBAO [JOURNAL OF ENGINEERING THERMOPHYSICS-
in Chinese Vol 8 No 1, Feb 87 pp 91-94

[English abstract of article by Zhang Mingchuan [4545 2494 1557] of the
Thermal Power Engineering Research Institute, Xi'an; J.Y. Shang and J.S. Mei
of USDOE Morgantown Energy Technology Center, U.S.A.; and R. Yang of West
Virginia University]

[Text] With special consideration taken for gas-solid bubbling fluidized beds,
the previous similarity criteria for fluidized beds, which are composed of
four or five dimensionless groups, can be simplified significantly. In this
paper, a new derivation of the similarity criteria based on simplified dif-
ferential equations for bubbling gas fluidized beds is presented. The
validity for approximate scaling has been tentatively confirmed by some
initial experiments conducted in two different sized two-dimensional beds.

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CSO: 4009/29

EXTENSION OF POINCARÉ'S NONLINEAR OSCILLATION THEORY TO CONTINUUM MECHANICS (I)
--BASIC THEORY AND METHOD

Chongqing YINGYONG SHUXUE HE LIXUE [APPLIED MATHEMATICS AND MECHANICS] in
Chinese Vol 8 No 1, Jan 87 pp 1-9

[English abstract of article by Huo Linchun [7202 7792 2504], et al., of
Tianjin University]

[Text] In this paper the authors extend Poincaré's nonlinear oscillation theory of discrete systems to continuum mechanics. First they investigate the existence conditions of a periodic solution for a linear continuum system in the states of resonance and nonresonance. By applying the results of linear theory, they prove that the main conclusion of Poincaré's nonlinear oscillation theory can be extended to continuum mechanics. In addition, a new method is suggested to calculate the periodic solution in the states of both resonance and nonresonance by means of direct perturbation of partial differential equations and weighted integration.

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EQUILIBRIUM AND BUCKLING OF COMBINED SHELLS UNDER UNIFORM EXTERNAL PRESSURE

Chongqing YINGYONG SHUXUE HE LIXUE [APPLIED MATHEMATICS AND MECHANICS]
in Chinese Vol 8 No 1, Jan 87 pp 55-68

[English abstract of article by Song Tianxia [1345 1131 7209], et al., of
Huazhong University of Science and Technology, Wuhan]

[Text] Nonlinear strain is used to formulate the energy function of a combined structure with several kinds of shells. The nonlinear finite element method (NFEM) is proposed for calculating bending and buckling of the structure subjected to external hydrostatic pressure. The numerical results are found to be in good agreement with experimental ones. (Paper received 5 Oct 85.)

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HIGHER-ORDER THEORY OF INTERNAL SOLITARY WAVES WITH FREE SURFACE IN TWO-LAYER FLUID SYSTEM OF FINITE DEPTH

Chongqing YINGYONG SHUXUE HE LIXUE [APPLIED MATHEMATICS AND MECHANICS]
in Chinese Vol 8 No 1, Jan 87 pp 69-77

[English abstract of article by Zhou Chinfu [0719 3237 3940] of the Department of Mathematics and Mechanics, Zhongshan University, Guangzhou]

[Text] A higher-order approximation theory of internal solitary waves with a free surface is presented. Using the method of strained coordinates, the third-order approximation evolution equation of interface is determined. An analytic expression of the wave velocity is given. The evolution equation has been solved numerically. It is found that the effects of a free surface on the shape and wave velocity of a solitary wave are $O(\epsilon^2)$, and the third-order numerical solutions are closer to the experimental data than are the first- and second-order solutions. (Paper received 10 Feb 85.)

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EFFECTS OF TRANSVERSE SHEAR ON NONLINEAR BENDING OF RECTANGULAR PLATES LAMINATED OF BIMODULAR COMPOSITE MATERIALS

Chongqing YINGYONG SHUXUE HE LIXUE [APPLIED MATHEMATICS AND MECHANICS]
in Chinese Vol 8 No 1, Jan 87 pp 79-85

[English abstract of article by Huang Xiaoqing [7806 1420 3237], et al., of the South China Institute of Technology, Guangzhou]

[Text] This paper investigates the application of the Dynamic-Relaxation (DR) method to the problems of nonlinear bending of rectangular plates laminated with bimodular composite materials. The classical lamination theory and a shear deformation theory of layered composite plates, taking into account large rotations (in the von Kármán sense), are employed separately to analyze the subject.

It has been found here that the estimate of fictitious densities which control the convergence and numerical stability of the nonlinear DR solution considering the transverse shear effect still needs to be investigated. In this paper, a procedure to calculate fictitious densities is presented, thereby ensuring the numerical stability of this topic.

The main steps for solving the nonlinear bending of bimodular composite laminates by means of the DR method are outlined. The numerical results are given for simply supported, two-layer cross-ply rectangular plates made of mildly bimodular material (Boron-Epoxy (B-E)) and highly bimodular materials (Aramid-Rubber (A-R) and Polyester-Rubber (P-R)) under sinusoidally distributed and uniformly distributed transverse loads. The results obtained are compared with linear results and those obtained for laminates fabricated from conventional composite materials, the elastic moduli of which are identical with the tensile moduli of the bimodular materials. In addition, the effect of transverse shear deformation on nondimensionalized center deflection is studied. (Paper received 25 Nov 85.)

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SIMPLIFICATION OF EXPANSIONS OF VISCOUS TERMS IN BASIC AERODYNAMIC EQUATIONS
IN NON-ORTHOGONAL CURVILINEAR COORDINATE SYSTEM

Chongqing YINGYONG SHUXUE HE LIXUE [APPLIED MATHEMATICS AND MECHANICS]
in Chinese Vol 8 No 1, Jan 87 pp 87-94

[English abstract of article by Wang Zhongqi [3769 0112 1142], et al., of
Harbin Institute of Technology]

[Text] The application of a non-orthogonal curvilinear system to the calculation of the flow field inside the channel, with complex boundary geometry, can effectively simplify the work of designing the calculation program and improve the accuracy of calculation. Therefore, it is obviously necessary to expand the viscous terms, i.e., viscous force, rate of work done by viscous stress and dissipation, in basic aerodynamic equations in the non-orthogonal curvilinear system. However, each of these expansions consists of tens or even hundreds of algebraic terms. The expansions of the three viscous terms described in this paper are considerably simplified by analyzing their order of magnitude. (Paper received 19 Feb 85.)

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ON PREDICTION AND CONTROL OF POPULATION PROBLEM

Xiamen XIAMEN DAXUE XUEBAO (ZIRAN KEXUE BAN) [JOURNAL OF XIAMEN UNIVERSITY (NATURAL SCIENCE)] in Chinese Vol 25 No 1, Jan 86 pp 27-33

[English abstract of article by Lin Jianbing [2651 1017 0393] of the Department of Computer Science]

[Text] In this paper the population problem of local areas (a province or a city) is discussed. Comments on the evolution equation of the population

$$\frac{\partial p(r,t)}{\partial t} + \frac{\partial p(r,t)}{\partial r} + \mu(r,t)p(r,t) = 0, \quad r \geq 0$$

under the boundary conditions

$$p(r,0) = p_0(r), \quad p(0,t) = \psi(t), \quad t \geq 0$$

are given. At the end of the paper some modified models of population equations:

$$\begin{cases} p_t = -p_r - \mu p + f & 0 < r \leq r_0 \\ p_t = \varepsilon p_{rr} - (1-\varepsilon\mu)p_r - (\mu - \mu_r \varepsilon)p + f, & r_0 < r < r_m \end{cases}$$

are given for short period prediction, and treatments for these population problems are considered. (Paper received January 1985.)

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DETERMINATION OF LEVELING BY RDE ANODIC STRIPPING

Xiamen XIAMEN DAXUE XUEBAO (ZIRAN KEXUE BAN) [JOURNAL OF XIAMEN UNIVERSITY (NATURAL SCIENCE)] in Chinese Vol 25 No 1, Jan 86 pp 68-74

[English abstract of article by Xu Jiayuan [6079 1367 0954] and Zhou Shaomin [0719 4801 3046] of the Department of Chemistry]

[Text] Based on the difference in thickness of the diffusion layer over recesses and convexes of the micro-profile, the different rotating speeds of a disk electrode have been used to simulate the recesses and convexes, and anodic stripping of the deposits on the disk electrode is suggested as an estimate of the levelling effect of additives. The leveling values and optimum concentrations of the leveling agents for nickel plating, e.g., 1,4-butyne-1,3-diol, etc., have been determined with the technique described above, and the results of the optimum concentrations are in good agreement with those found in the literature. The relative inhibition $(Q_s Q_r)/Q_s$ of the leveling agents is found to be linearly dependent upon their concentrations (in a range of less than the optimum concentration). This relationship can be used as the calibration curve to determine the concentration of leveling agents with a relative error of less than 10 percent. (Paper received April 1985.)

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EFFECTS OF INFRASONICS ON PROLIFERATION AND METABOLISM OF SACCHAROMYCES CEREVISIAE

Xiamen XIAMEN DAXUE XUEBAO (ZIRAN KEXUE BAN) [JOURNAL OF XIAMEN UNIVERSITY (NATURAL SCIENCE)] in Chinese Vol 25 No 1, Jan 86 pp 89-97

[English abstract of article by Zheng Zhicheng [6774 1807 2052] and Zhou Meiying [0719 5019 5391] of the Department of Biology]

[Text] Effects of treating infrasonics of median intensity (121 to 126 dB) and low frequency (5 to 19 Hz) on Saccharomyces cerevisiae culture have been investigated. Taking the increment of protein content as a convenient and quantitative index of the populational growth of yeast, it was found that the increment is promoted in prolonging the activation time from the stock slant, e.g., 32.0 percent increment was achieved in 36 hours activation by 5 hours of treatment at 17 Hz, 124 dB infrasonics. Protein increment of 30 percent can be gained after 5 hours of treatment, and the increment is accelerated by raising the infrasonic strength to the range of 121-124 dB and frequency from 5-19 Hz. Results show that infrasonic treatment promotes the nitrogen metabolism of yeast remarkably. The cell protein increase curve was found to be concomitant with the amino-N consumption curve in responding to the rising infrasonic frequency. This fact is evidence that amino-N is the direct N source for protein synthesis. However, the rate of sugar assimilation does not increase when the cell protein increases remarkably. Under experimental conditions (124 dB, 3 hours treatment), the relative dissolved oxygen content in the culture solution increased with the rising infrasonic frequency (5-19 Hz). This can be taken as an effective factor in the promotion of yeast metabolism and cell proliferation. The authors suggest that it is the infrasonic vibrational action via the liquid-air interphase accelerating gas-exchange and molecular motion in the liquid that makes dissolved oxygen always available for yeast assimilation, and therefore promotes the proliferation and metabolism of the cell. (Paper received August 1985.)

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KINETICS AND MECHANISM OF PALLADIUM (II) EXTRACTION WITH 2-HYDROXY-4-(1-METHYLHEPTOXY)-BENZOPHENONE OXIME

Shanghai HUAXUE XUEBAO [ACTA CHIMICA SINICA] in Chinese Vol 44 No 11, Nov 86 pp 1087-1092

[English abstract of article by Ma Enxin [7456 1869 2450], et al., of Shanghai Institute of Organic Chemistry, Chinese Academy of Sciences]

[Text] The fundamental constants of 2-hydroxy-4-(1-methylheptoxy)benzophenone oxime (N530), such as distribution constant K_{DR} , dimerization constant K_{DP} and dissociation constant K_a , have been measured by the partition method. The equilibrium constant for extraction of palladium (II), $Pd^{2+} + 2HL(o) \xrightleftharpoons{K_{ex}} PdL_2(o) + 2H^+$, was found to be $\lg K_{ex} = 16.88 \pm 0.04$ (in chloroform) and 18.09 ± 0.01 (in n-dodecane). The homogeneous chemical reaction in the aqueous phase, $PdCl_3^- + HL \xrightleftharpoons{k_1} PdCl_2L^- + Cl^- + H^+$, was established as being the rate-determining step, having $k_1 = 2.42 \times 10^2 L \cdot mol^{-1} \cdot s^{-1}$. The activation energies 30.0 ± 3.2 (in chloroform) and 28.9 ± 1.9 $kJ \cdot mol^{-1}$ (in n-dodecane) independent of the diluent were determined. Interfacial characteristic study showed that the interface was saturated with extractant when its bulk concentration was greater than $10^{-2} mol \cdot L^{-1}$, which was less than that in the determination of the rate equation. All this evidence further supports the presence of an aqueous chemical reaction regime. (Paper received 2 Aug 85.)

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STUDIES OF NUCLEIC ACID CHEMISTRY. V. SYNTHESIS OF MODIFIED RIBONUCLEOTIDES AND OLIGORIBONUCLEOTIDES

Shanghai HUAXUE XUEBAO [ACTA CHIMICA SINICA] in Chinese Vol 44 No 11, Nov 86 pp 1106-1112

[English abstract of article by Yang Zaiwan [2799 0375 1346], et al., of Shanghai Institute of Organic Chemistry, Chinese Academy of Sciences]

[Text] Modified ribonucleotide ψ p and its oligoribonucleotides ψ pCpG and Tp ψ pCpG, as well as tetra-ribonucleoside triphosphate CpCpCpG located in the vicinity of the same T ψ C arm of t-RNA^{Ala}_y, have been synthesized.

5'-O-monomethoxytrityl-2'-O-benzoylpseudouridine 3'-phosphate (5) was synthesized by using 5'-O-monomethoxyltritylpseudouridine through successive phosphorylation with morpholinophosphodichloridate, cyclization with dilute alkali, digestion with pancreatic ribonuclease A and finally benzylation with benzoylimidazole. The overall yield of 5 was about 40 percent.

2', 5'-O-dibenzoylribothymidine 3'-phosphate (6) was prepared through benzylation of ribothymidine 3'-phosphate with benzoylimidazole (yield about 80 percent). ψ pCpG (3) and Tp ψ pCpG (1) were synthesized in the presence of DCC by stepwise condensation of appropriately protected monoribonucleotides 5 and 6 with diribonucleoside monophosphate, Cbz G^{ibu}_{bzp}(ibu)₂ (12) according to the synthetic scheme with yields of 35 and 25 percent respectively.

Protected tetra-ribonucleoside triphosphate (MeOTr) Cbz Cbz Cbz G^{ibu}_{bzp}(ibu)₂ was synthesized by block condensation of (MeOTr)Cbz Cbz Cbz (4) with G^{ibu}_{bzp}(ibu)₂ (9) according to the synthetic scheme. After deprotection, CpCpCpG (2) was obtained (yield 17 percent).

All these oligoribonucleotides synthesized were homogeneous on paper chromatography and paper electrophoresis. The base ratios of the obtained individual oligoribonucleotide agreed with those of the expected oligoribonucleotides on the determination by RPC-5 column chromatography after digestion of the sample with pig spleen phosphodiesterase. The sequences of CpCpCpG and Tp ψ pCpG were determined by two-dimensional electrophoresis-homochromatography after labeling the 5'-terminal hydroxyl group with (γ -³²P)ATP by polynucleotide kinase and partial hydrolysis with snake venom phosphodiesterase. The autoradio patterns are in accordance with those of the 5'-³²P-labeled oligoribonucleotides.

The synthetic oligoribonucleotides, CpCpCpG and Tp ψ pCpG, of which the ribonucleotide sequences corresponded to those of 50~53 and 54~57 fragments from the 5'-terminal of t-RNA^{Ala}_y molecule respectively, have been successfully used in the synthesis of the dodecaribonucleotide GpUpCpUpCpCpGpTp ψ pCpG, 3'-terminal half molecule and the whole molecule of t-RNA^{Ala}_y. (Paper received 18 Jun 85.)

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- [17] 使用未经纯化的 (MeOTr)G, 经异丁酰化得到的产物, 用 TLC 鉴定, 除显示所需要产物外, 在邻近还有一杂质点, 难以分离, 它们酸解后再与 (MeOTr)C₆₂P 缩合, 其产物 (MeOTr)C₆₂P₂G₁₈ 的附近。TLC 鉴定仍存一杂质点。

STUDIES OF NUCLEIC ACID CHEMISTRY. VII. SYNTHESIS OF FOUR OLIGORIBONUCLEOTIDES OF DIHYDROURIDINE (D) LOOP OF YEAST ALANINE TRANSFER RNA

Shanghai HUAXUE XUEBAO [ACTA CHIMICA SINICA] in Chinese Vol 44 No 11, Nov 86 pp 1113-1121

[English abstract of article by Yang Binghui [2799 3521 6540], et al., of Shanghai Institute of Organic Chemistry, Chinese Academy of Sciences]

[Text] The preparation and protection of 3'-DMP and dihydrouridine (Dr) and the synthesis of four oligoribonucleotides composed of these are reported.

DMP was obtained by hydrogenation of 3'-UMP, which was first converted to free acid by a cation exchanger (H form), in the presence of platinum dioxide, and Dr was similarly obtained from Ur in the presence of platinum dioxide and alumina in aqueous-acetic acid (pH 2~3). They were monomethoxytritylated and benzoylated to (MeOTr)-D_{bzp} (10) and (MeOTr)D(Bz)₂ (18), respectively. The latter was converted to D(Bz)₂ (18a) by demethoxytritylation.

The oligoribonucleotides containing DMP or Dr (corresponding to 14~16, 14~17, 14~19 and 20~22 fragments of the D-loop of t-RNA^{Ala}) were synthesized as shown in the article. ApGpD and ApGpDpC were obtained through condensation of 6a with 18a or 21a followed by deprotection. ApGpDpCpGpG was synthesized by coupling 5a with 4a, prepared from condensation of 6a with 7a, followed by the removal of protecting groups. DpApG was synthesized by coupling 10 with 23a, prepared by condensation of 22 and 26, and followed by deprotection. These compounds were synthesized via phosphotriester approach and TPST (triisopropylbenzenesulphonic triazole), MSTe (trimethylbenzenesulphonic tetrazole), MSNI (trimethylbenzenesulphonic nitroimidazole) and MSNT (trimethylbenzenesulphonic nitrotriazole) were used as condensing reagents for a preliminary comparison of the coupling yields.

The yields of two trinucleoside diphosphates and tetranucleoside triphosphate were about 38 percent, 21 percent and 20 percent respectively; but the hexanucleoside pentaphosphate was formed in poor yield. DpApG synthesized via the phosphotriester method was obtained in 80 percent yield.

These synthetic oligoribonucleotides, ApGpD, DpApG, ApGpDpC and ApGpDpCpGpG, were checked for purity and nucleotide sequences as usual. ApGpDpCpGpG and DpApG have been used for enzymatic synthesis of ApGpDpCpGpGpDpApG, which has in turn been used successfully for the synthesis of a 5'-half molecule and total synthesis of yeast alanine t-RNA. (Paper received 31 Mar 85.)

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SYNTHESIS OF m-PHENOXY- α' -CYANOBENZYL- α -[O-ALKYL, -O'-ALKYL-(PHENYL)DITHIO-
PHOSPHOR(ON)YL] ISOVALERATES

Shanghai HUAXUE XUEBAO [ACTA CHIMICA SINICA] in Chinese Vol 44 No 11, Nov 86
pp 1122-1128

[English abstract of article by Chen Ruyu [7115 5423 3768], et al., of the
Institute of Elemento-Organic Chemistry, Nankai University, Tianjin]

[Text] Three groups of ten novel compounds containing both phosphorus and
pyrethroid skeleton--m-phenoxy- α' -cyanobenzyl- α -dithiophosphor(on)yl
isovalerates (acetates) have been synthesized and their structures established
by elemental analysis, IR, ^1H NMR and MS. Conditions for the preparation of
the intermediates have been improved. Methods for the synthesis and purifica-
tion of the products have been studied. Some abnormal phenomena in the
spectra are discussed. (Paper received 22 May 85; revised 26 Oct 85.)

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SYNTHESIS OF ALLENES AND BICYCLOBUTANE DERIVATIVES BY USE OF ULTRASOUND

Shanghai HUAXUE XUEBAO [ACTA CHIMICA SINICA] in Chinese Vol 44 No 11, Nov 86
pp 1134-1138

[English abstract of article by Xu Linxiao [6079 5259 2556], et al., of the
Institute of Material Science, Fudan University, Shanghai]

[Text] A convenient method for the synthesis of allenes and bicyclobutane derivatives is provided by the reactions of gem-dihalocyclopropanes with metals (Li, Mg or Na) under ultrasonic irradiation. The reactions are usually completed in 5 to 15 minutes and good yields are obtained. (Paper received 22 Jul 85.)

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CALCULATION OF NUCLEAR SPIN-SPIN COUPLING CONSTANTS. VII. CALCULATION OF COUPLING CONSTANTS IN DISUBSTITUTED NAPHTHALENES

Shanghai HUAXUE XUEBAO [ACTA CHIMICA SINICA] in Chinese Vol 44 No 11, Nov 86 pp 1146-1148

[English abstract of article by Wang Hongjun [3769 1347 6874], et al., of Fujian Institute of the Structure of Matter, Chinese Academy of Sciences, Fuzhou]

[Text] The principle and method for calculating the coupling constants of substituted benzenes have been extended to the calculation of the coupling constants in disubstituted naphthalenes.

The calculated results of 443 J values from 74 compounds show that the standard deviation between the calculated and experimental values is 0.23 Hz.

The combination of this calculation together with that of the chemical shifts can be used to provide the theoretical criterion for the determination of molecular structure in disubstituted naphthalenes as well as to assign the NMR parameters for the experiment of proton simulated spectra of disubstituted naphthalenes. (Paper received 8 Jul 85.)

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^{151}Eu MOSSBAUER SPECTRA AND STRUCTURAL PROPERTIES OF ORGANOMETALLIC COMPOUNDS
CONTAINING EUROPIUM-METAL BOND

Shanghai HUAXUE XUEBAO [ACTA CHIMICA SINICA] in Chinese Vol 44 No 11, Nov 86
pp 1155-1158

[English abstract of article by Wang Xukun [3769 1645 2492], et al., of the
Institute of Elemento-organic Chemistry, Nankai University, Tianjin; Xia Yuanfu
[1115 0337 1788], et al., of the Department of Physics, Nanjing University]

[Text] Five new organometallic compounds containing europium-metal bond have
been synthesized and characterized. The ^{151}Eu Mossbauer spectra of these
compounds show a trivalent europium in these compounds with different
electronic densities on the europium. This fact has been further confirmed
by the IR and other investigations of these compounds. (Paper received
7 May 85.)

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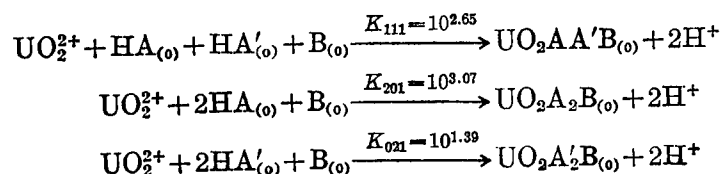
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STUDY OF TERNARY SYNERGISTIC EXTRACTION OF URANIUM BY CHELATE-CHELATE-NEUTRAL EXTRACTANT

Shanghai HUAXUE XUEBAO [ACTA CHIMICA SINICA] in Chinese Vol 44 No 11, Nov 86 pp 1159-1162

[English abstract of article by Chen Yude [7115 5280 1795], et al., of the Department of Nuclear Science, Fudan University, Shanghai]

[Text] The synergistic extractions of uranyl nitrate using PMBP(HA), TTA(HA') and TBP(B) have been studied from chloroform media. The extraction reactions were found to be



respectively. (Paper received 8 Jul 85.)

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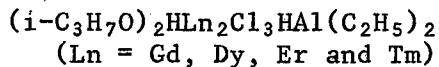
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CRYSTALLINE ACTIVE CATALYTIC SPECIES OF COORDINATION CATALYST BASED ON RARE-EARTH

Shanghai HUAXUE XUEBAO [ACTA CHIMICA SINICA] in Chinese Vol 44 No 11, Nov 86 pp 1163-1166

[English abstract of article by Li Xingmin [2621 5281 3046], et al., of Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, Changchun]

[Text] The isolation of an active catalytic species presents an intriguing facet in identifying the structure of species at work in coordination polymerization and in clarifying the polymerization mechanism. Four new active catalytic species of rare earth coordination catalysts were isolated in the $(i-C_3H_7O)_3Ln-Et_2AlCl-Et_3Al$ and $(i-C_3H_7O)_2LnCl-Et_3Al$ catalyst systems. From quantitative analysis, IR and gas analysis, it is considered that the molecular formulae of the complexes are probably as follows:



The results of polymerization of butadiene and isoprene indicate that the complexes are active species of the above binary and ternary catalyst systems, and a double bridged structure of the lanthanide complexes is proposed.
(Paper received 13 Jul 85.)

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STUDY OF DEVIATIONS OF RATE ACCELERATIONS IN β -CYCLODEXTRIN-CATALYZED HYDROLYSIS OF PHENYL ESTERS IN DMSO-H₂O SYSTEM

Shanghai HUAXUE XUEBAO [ACTA CHIMICA SINICA] in Chinese Vol 44 No 11, Nov 86 pp 1179-1181

[English abstract of article by Zhang Daodao [4545 6670 6670], et al., of the Department of Chemistry, Fudan University, Shanghai]

[Text] When a glass electrode is used for measuring pH values in a DMSO-H₂O solvent for kinetic experiments, the pH values of reaction solutions cannot be larger than 12, otherwise considerable deviation will be caused. Therefore, it is pointed out that the rate acceleration of p-nitrophenyl-2-ferrocenyl-acrylate should be changed from 3.6×10^5 to 8,200. (Paper received 27 Jun 85.)

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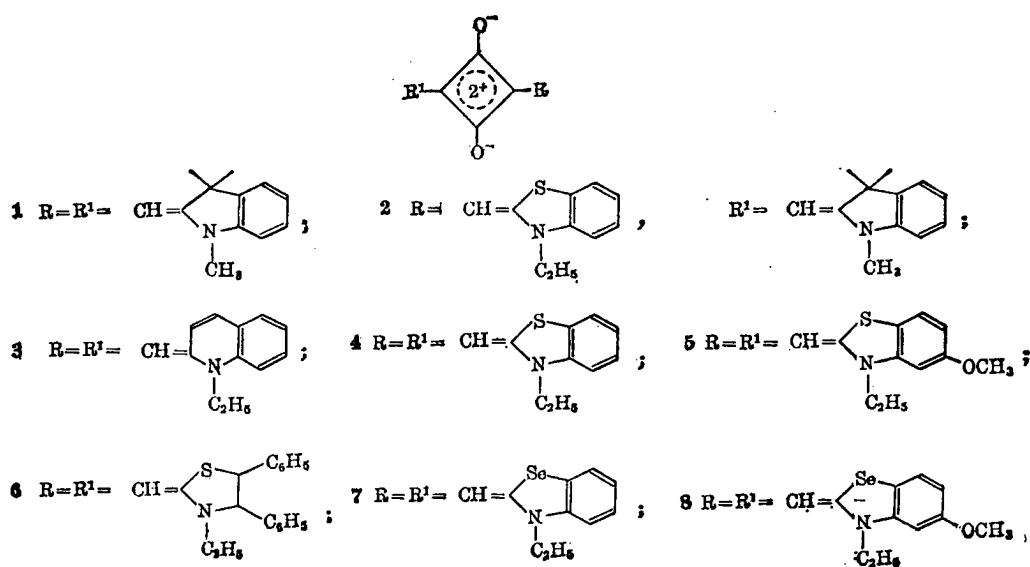
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SYNTHESIS OF SQUARYLIUM CYANINE DYES

Shanghai HUAXUE XUEBAO [ACTA CHIMICA SINICA] in Chinese Vol 44 No 11, Nov 86 pp 1182-1184

[English abstract of article by Jiang Songchun [5592 2646 2504], et al., of the Department of Fine Chemical Technology, East China Institute of Chemical Technology, Shanghai]

[Text] Squaric acid was prepared from hexachlorobutadiene. The yield was slightly improved when compared to that mentioned in the literature. Through the condensation of squaric acid with different basic heterocyclic compounds, eight cyanine dyes were synthesized. Compounds No 2 and No 6 were new.



(Paper received 29 May 85.)

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9717

CSO: 4009/1043

APPLIED SCIENCES

REFLECTION TRANSMISSION AND ABSORPTION OF ELECTROMAGNETIC WAVES AFFECTED BY
NON-UNIFORM PLASMA

Hefei ZHONGGUO KEXUE JISHU DAXUE XUEBAO [JOURNAL OF CHINA UNIVERSITY OF
SCIENCE AND TECHNOLOGY] in Chinese Vol 16 No 4, Dec 86 pp 412-420

[English abstract of article by Xu Yanhou [1776 3601 0186] of the Department
of Modern Mechanics; Ji Zhenyu [1518 7201 1342] of the Department of
Precision Machinery and Instrumentation; Wang Boyi [3769 2672 2034] of the
Institute of Mechanics, Chinese Academy of Sciences]

[Text] This paper presents a method to study the propagation of electro-
magnetic waves in a non-uniform plasma stratified media by an inequable
segmented model, which gives formulae for power transmissive and reflective
coefficients of electromagnetic waves using the invariant bedding principle.
This method has been used in research of the propagative characteristics
of both normal incidence and oblique incidence cases, and the effects of a
stable magnetic field on propagation are given.

FULL-POTENTIAL FUNCTION EQUATIONS USED IN COMPUTING TRANSONIC ROTATIONAL FLOW

Hefei ZHONGGUO KEXUE JISHU DAXUE XUEBAO [JOURNAL OF CHINA UNIVERSITY OF SCIENCE AND TECHNOLOGY] in Chinese Vol 16 No 4, Dec 86 pp 421-426

[English abstract of article by Lu Panming [0712 4149 2494] of the Department of Engineering Thermophysics]

[Text] Full-potential function equations have been proven to be effective methods for transonic flow computations, but the effect of entropy has not yet been considered. Three new full-potential equation groups, which include the effects of entropy and can be used to compute the internal rotational flow of a transonic axial-flow compressor rotor, are presented in this paper. A comparison of the computational results of two rotors (IETP-1 and DFVLR rotor) and experimental data shows that the new methods are more accurate than the former ones and the effect of entropy is much more important than that of vorticity.

9717

CSO: 4009/32

ENVIRONMENTAL QUALITY

SHANXI CHEMICAL SPILL AFFECTS 15,455 PEOPLE

HK231528 Beijing CHINA DAILY in English 23 Mar 87 p 1

[By staff reporter Wen Jia]

[Text] More than 15,400 people were affected by poisonous chemical liquor released by a fertilizer factory in North China's Shanxi Province into a river used as a source of drinking water.

Those responsible for the spillage are to be charged in a local court soon, CHINA DAILY has learned.

According to Zhu Xingxiang, a deputy chief of the Water Division in the State Environment Protection Bureau, the poison did not cause any deaths, although a lot of fish in the river were killed. The people affected had headaches, stomach pains and diarrhoea. The economic loss is estimated to amount to 580,000 yuan (US\$154,000).

The pollution took place on 2 January when workers in Zhangzi County Fertilizer Factory were repairing machinery without adequate protection.

Some 15.7 cubic metres--about 18 tons of highly poisonous ammonium hydrogen carbonate liquid passed through the drains into Nanzhang River.

Water in the river, in the dry season, was badly polluted. Next week, the density of pollutants, mainly amino nitrogen, cyanide and sulphide rose. At its highest point, the amount of amino nitrogen was 337 times above the standard.

In the lower reaches of the Nanzhang River, people in three factories and four villages had been using it as their source of drinking water. Unaware of the contamination at first, more than 23,000 people drank the polluted water and 15,455 became ill.

But senior officials of the factory did not take any measures to stop the flow, neither did they warn the people in the lower reaches.

Three days after the accident, the Government of Changzhi City, which has direct jurisdiction over the county, learned about the case from reports of the enraged Huifeng Machinery Factory. An investigation has started immediately.

On 8 January, the fertilizer factory was ordered to stop production. Next day, workers at the Huifeng Machinery Factory started to drink tap water from Changzhi City. Water in the polluted Nanzhang River was also diluted.

By 12 January, the Huifeng Machinery Factory returned to normal production, after most of the sufferers had recovered.

Investigation groups from the much concerned State Environment Protection Bureau and three other ministries in Beijing soon came to Zhangzi County. By the end of last January, the Environment Protection Bureau of Changzhi City fined the fertilizer factory 130,000 yuan.

Earlier the Zhangzi County's Government and party committee had decided to fine the factory leaders. They removed the Vice-Director Yuan Jie, who was present when the accident occurred but did not inform the direction in time.

On the orders of the State Environment Protection Bureau, the provincial Government of Shanxi last month formed a united group and opened an inquiry.

"The group has completed their work now," said the official in the Environment Protection Bureau, "And charges and the trial of those responsible are expected."

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END