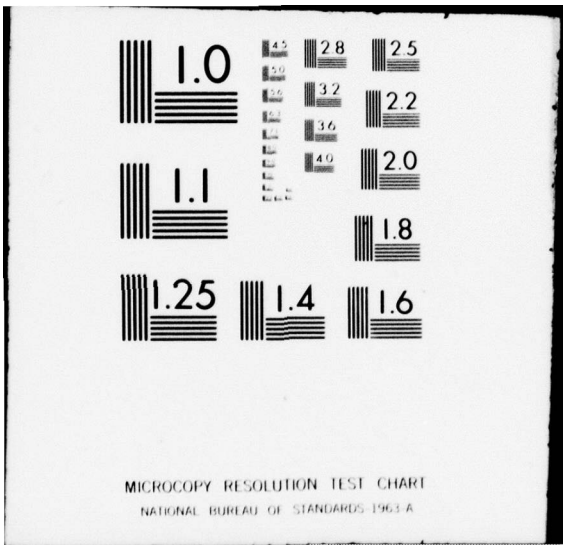
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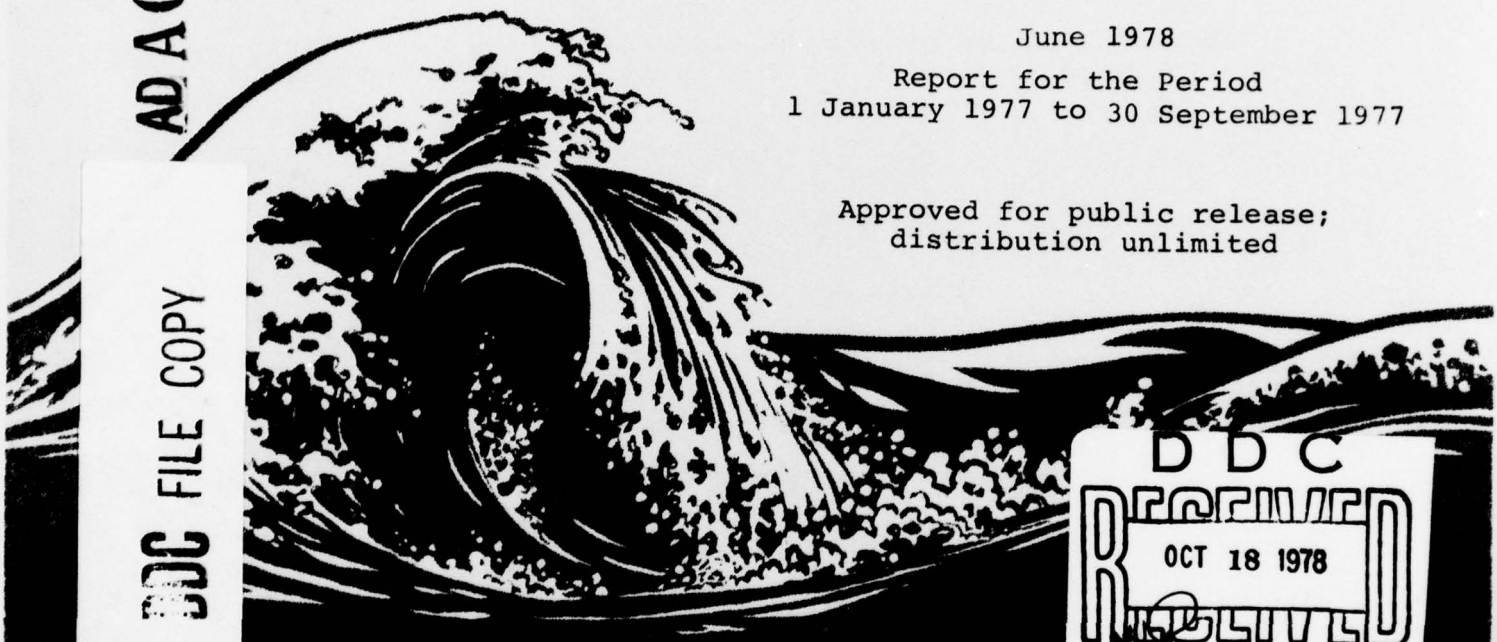
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Optimal Bayesian Estimation of the State of a Probabilistically Mapped Memory-Conditional Markov Process with Application to Manual Morse Decoding

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B.E.E., Georgia Institute of Technology, 1969
M.S.E.E., Naval Postgraduate School, 1974
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This dissertation investigates the problem of automatic transcription of the hand-keyed Morse signal. A unified model for this signal process transmitted over a noisy channel is shown to be a system in which the state of the Morse process evolves as a memory-conditioned probabilistic mapping of a conditional Markov process, with the state of this process playing the role of a parameter vector of the channel model. The decoding problem is then posed as finding an optimal estimate of the state of the Morse process, given a sequence of measurements of the detected signal. The Bayesian solution to this nonlinear estimation problem is obtained explicitly for the parameter-conditional linear-gaussian channel, and the resulting optimal decoder is shown to consist of a denumerable but exponentially expanding set of linear Kalman filters operating on a dynamically evolving trellis. Decoder performance is obtained by computer simulation, for the case of random letter message texts. For nonrandom texts, further research is indicated to specify linguistic and format-dependent models consistent with the model structure developed herein.

Doctor of Engineering
September 1977

Thesis Advisor: S. Jauregui
Electrical Engineering
Department

Properties of Residual Mixing Distributions Resulting from Arbitrary Mixtures of Exponential Life Distributions

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M.S., Naval Postgraduate School, 1971

A mixture of failure rates can be present in an apparently homogeneous population of "devices" due to variability either in their manufacture or in the severity of their service environments. An initial mixing distribution is the probability distribution for different failure rates in such a population. This distribution may be updated to yield its related residual mixing distribution, which is the probability distribution for different failure rates in the population of survivors after a specified period of service or "burn-in." Residual mixing distributions resulting from arbitrary mixtures of constant failure rates are shown to be stochastically ordered (decreasingly) as the period of service or burn-in is increased, and to approach in the limit a distribution degenerate at the smallest failure rate "present" in the population. Properties of expected value ordering, stochastic ordering, failure rate ordering and likelihood ratio ordering are investigated to show that, of these, only likelihood ratio ordering between two initial mixing distributions is sufficient to guarantee an ordering between the expected values of their respective residual mixing distributions over time.

Doctor of Philosophy
June 1977

Advisor: James D. Esary
Operations Research
Department

A Dynamic Stochastic Model of Corporate Behavior Over the Business Cycle with a Special Application to the Major U.S. Military Airframe Builders

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B.A., Cambridge University, 1973
M.A., Cambridge University, 1977

This thesis contains a formulation of a dynamic stochastic model of corporate behavior over the business cycle and applies the basic model to firms in the U.S. airframe industry. The literature dealing with the theory of the firm is surveyed and a taxonomy is developed within which the major contributions to the literature are appraised.

The basic model is formulated as an optimal control problem. The model is used to study the behavior of the firm over the business cycle and to suggest a possible reconciliation of the traditional and managerial theories of the firm. Financial considerations are incorporated into the model and the relationship between the firm's optimal operating decisions and its optimal financial decisions is examined. Organizational factors are introduced and some of the consequences of decentralized decision-making for the loss of control and X-efficiency are studied.

The basic model is extended to the major airframe builders by incorporating factors specific to that industry's institutional milieu. A model of a representative airframe builder is formulated as a stochastic optimal control problem and is used to study the impact of the government's progress payments policy and the likely impact of making interest expense an allowable cost under government contracts.

Doctor of Philosophy
September 1977

Advisor: Carl R. Jones
Dept. of Administrative Sciences

Numerical Methods for Solution of
Queuing-Network Problems with Applications to
Models of Multiprogrammed Computer Systems

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M.S., University of Utah, 1970

The major difficulties in determination of the steady-state properties of a Markovian queuing network by numerical solution of a set of linear balance equations are the choice of vector representation of the states, the generation and storage of the states, and generation, storage and solution of the balance equations. Lexicographic sequencing of the vector representations are shown in this thesis to lead to efficiencies in the storage and solution of the balance equations and to provide a key to efficient generation and storage of the states. Convergence properties of three iterative solution methods are examined for cyclic models, such as those which can result from a central-server model. An analysis of possible bias in software monitors on computer systems is analyzed in terms of a central-server model of such systems. Techniques for examining tape-mounting policies and core-allocation policies are also suggested.

Doctor of Philosophy
September 1977

Advisor: Donald P. Gaver
Department of
Operations Research

Maneuvering Strategies for Optimal Evasion of a
Proportionally Navigated Missile

by

Robert Harper Shumaker
Captain, United States Navy
B.S., United States Naval Academy, 1956
M.S., Naval Postgraduate School, 1975

The problem of how to optimally maneuver an aircraft in the face of the homing missile threat is addressed. The criterion of judgment is the miss distance which is the separation distance at the point of closest approach.

The problem is modeled in state space in both two and three dimensions and incorporates time delays in response to command and also constraints on the turning rates of both vehicles. Various non-linear programming methods are employed to derive an open-loop strategy. Since these techniques are computationally time consuming, several strategies are proposed and analyzed, which lead to a closed-form, slightly sub-optimal solution which is capable of real time implementation.

Doctor of Philosophy
June 1977

Advisor: H. A. Titus
Electrical Engineering
Department

Unsteady Supersonic Cascade Theory:
Linear and Nonlinear Considerations

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This study presents two methods of analysis for the supersonic oscillating cascade with subsonic leading edge. A relatively straightforward solution is developed for the slowly oscillating finite and infinite flat-plate cascades which provides simple analytical expressions for the unsteady pressure distributions. Comparison with other solutions is generally excellent. Some additional linear topics including resonance and a unique inflow condition are also treated. In addition a nonlinear method of characteristics solution for finite cascades is described which permits analysis of blade thickness effects on flutter. At this time, only the inlet and passage flow computations have been completed and are compared with available experimental data.

Doctor of Philosophy
September 1977

Thesis Advisor: M.F. Platzer
Aeronautics Department

Barotropic Instability Of A Zonally Varying Easterly Jet

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B.S., United States Naval Academy, 1960
M.S., Naval Postgraduate School, 1967

The structure and behavior of barotropically unstable and stable wave disturbances in the vicinity of a zonally varying easterly jet are studied numerically with a linearized barotropic vorticity equation on a β-plane. The easterly jet is approximated by a Bickley jet with a slow zonal variation. The numerical results are also compared with a simple analytical model using the local phase speed and growth rate concepts. The results are grossly similar in several respects to that expected from the parallel flow theory of barotropic instability, however, the resultant structure of the waves causes a spatial growth rate greater than predicted by the local growth rates computed with a parallel flow model. In the stable region, the structure leads to strong dynamic damping. When a uniform current is superimposed on a variable mean flow, the differences between the behavior of the computed waves and that implied by the parallel flow theory are diminished. The waves remove kinetic energy from the mean flow and most of this energy is removed on the downwind side of the jet. The computer structure and behavior of the waves have a number of features that resemble those observed in the vicinity of the upper troposphere easterly jet during the summer monsoon.

Doctor of Philosophy
June 1977

Advisors: R. T. Williams
C. P. Chang
Meteorology
Department

Unsteady Surface Pressure
and Near-Wake Hotwire Measurements
of a Circulation Control Airfoil

Karl Aurel Kail, IV
Lieutenant, United States Navy
B.S., University of Colorado, 1967

The large lift coefficient changes attainable with Circulation Control Airfoils through small changes in boundary layer blowing suggest rotary wing cyclic control can be obtained through modulation of the blowing. Static pressure distributions were obtained to assess the unsteady behavior of a Circulation Control Rotor in a two-dimensional flow. A constant-radius hotwire wake traversing mechanism was constructed to augment the pressure data and to study the flow phenomena occurring in the region of Coanda jet separation. Through correlation of turbulence intensity data with pressure data, it was discovered that the point of Coanda jet separation could be located using the hotwire. The objective of these tests was accordingly expanded to include correlation of the location of separation with flow parameter variation.

Although steady flow, steady blowing tests results were favorable, the unsteady blowing test was restricted in scope because of an inability of the injection air compressor to provide an adequate flow, and because the real-time acquisition system was not completed in time for these tests. From mean value and RMS data obtained during oscillatory blowing, no increase in average lift augmentation above that produced in equivalent steady blowing was discernible.

Aeronautical Engineer
September 1977

Thesis Advisor: J.A. Miller
Aeronautics Department

Two-dimensional Nonrecursive Filter for Estimation and Detection of Targets

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B.S.E.E., 'Technion' High Technological Institute, Israel, 1970
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The concept and design of a two-dimensional linear non-recursive filter for enhancement and detection of targets in a noisy image are investigated. The filter provides optimal estimation of the image in the sense of minimization of the mean square estimation error (MMSE). The design procedure is based on the knowledge of stochastical properties of the image which includes targets, correlated (colored) random noises and uncorrelated (white) random noises. Filters of different structures were designed for a range of different images and tested by computer simulations.

Electrical Engineer
June 1977

Advisor: T. F. Tao
Electrical Engineering
Department

INVESTIGATION OF TANTALUM OXIDE AS AN INSULATOR IN MIS STRUCTURES

Benjamin George Belrose
Lieutenant, United States Navy
BSEE PURDUE UNIVERSITY 1970
MSEE NAVAL POSTGRADUATE SCHOOL MARCH 1976

Electrolytically anodized tantalum has been investigated for use as the insulating layer in MIS structures of three semiconductors: Si, GaAs and PbSnTe. Its high dielectric constant is of particular interest for low voltage integrated circiut operation and for infrared charge coupled imagers using lead salt semiconductors.

Tantalum was vapor deposited by an electron beam method and subsequently anodized in an electrolyte followed by a heat treatment. Good MIS structures on both n-type and p-type silicon have been obtained with a relative dielectric constant in the range from 20 to 40, flatband voltage on the order of ± 2 volts, and surface state density in the range from middle 10^{10} cm^{-2} to low 10^{12} cm^{-2}. Preliminary investigation of MIS structures of GaAs showed inversion but with large flatband voltage and surface state density.

Electrical Engineer
March 1977

Advisor: Tien F. Tao
Electrical Engineering
Department

A COMPUTER AIDED DESIGN OF DIGITAL FILTERS

Kayhan Elitas
Lieutenant
B.S.E.E., Naval Postgraduate School, 1975
M.S.E.E., Naval Postgraduate School, 1976

Expressions for a generalized Modified Transitional Butterworth-Chebyshev (MTBC) filter are derived. The characteristics of this filter as applied to digital filter design are investigated. It is shown that by adjusting location and order of the inserted zeros, the cut-off slope rate of the filter can be traded for maximum attenuation in the stop-band.

The performance of this MTBC filter is compared to that of Butterworth, Chebyshev, transitional Butterworth-Chebyshev filters together with those suggested by other investigators (1)-(3). It is shown that the stop-band attenuation can be significantly increased without great sacrifice of cut-off slope rate.

Step response of this MTBC filter is also obtained and compared with other filters. Various tabulations as well as graphs of this filter are given for design purposes. A computer program is developed for the design of this filter.

Electrical Engineer
June 1977

Advisor: S. G. Chan
Electrical Engineering
Department

Investigation of Heat Transfer in
Straight and Curved Rectangular Ducts
using Liquid Crystals Thermography

Mario do Carmo Durao
Lieutenant, Portuguese Navy

A rectangular cross section channel with both straight and curved test sections was used to investigate the effect of Taylor-Goertler vortices on the heat transfer from the curved section by comparing the results with those obtained in the straight section. The flow was heated through the Joulean heating of one of the walls which was made of Temsheet. Liquid crystals were applied on the surfaces of both test sections. Experiments were run for several values of the volumetric flow rate corresponding to Reynolds numbers between 258 and 920. The average Nusselt number was calculated for each experiment and plotted as function of the Reynolds and Dean numbers. Three distinct regions of the average Nusselt number were observed in the curved section when compared with the straight section. The presence of Taylor-Goertler vortices in the curved section was verified from the distribution of the liquid crystals color bands. It was concluded that the overall effect of the vortices whenever they occurred was to improve the heat transfer process from the curved section.

Thesis Advisor: M. Kelleher
Mechanical Engineering
Department

Mechanical Engineer
June 1977

Experimentally Determined
Effects of Eductor Geometry on the
Performance of Exhaust Gas Eductors for
Gas Turbine Powered Ships

John Peter Harrell, Jr.
Lieutenant, United States Navy
B.S., United States Naval Academy, 1970

Cold flow model tests of exhaust gas eductors with constant area mixing stacks were conducted to evaluate the effects of geometric configuration on eductor performance. Single-nozzle and four-nozzle designs were tested. The other geometric variables were mixing stack length to diameter ratio (L/D), primary nozzle standoff to diameter ratio (S/D), and mixing stack entrance configuration. Non-dimensional parameters governing the flow phenomena are developed from a one-dimensional analysis of a simple eductor system. The eductor performance is evaluated in terms of these non-dimensional parameters. The four-nozzle configurations were found to have better performance than single-nozzle configurations for L/D's less than eight. The effects of L/D, S/D, and entrance shape on performance were found to be highly interdependent at short L/D's. Performance for L/D's greater than four was found to be independent of S/D within the range of S/D's studied.

Mechanical Engineer
September 1977

Thesis Advisor: P.F. Pucci
Mechanical Engineering
Department

Scanning Electron Microscope Study
of Porous Zinc Battery Electrode Oxidation
after Service-Like Exposures in
Potassium Hydroxide Electrolyte

John Robert Savory
Lieutenant, United States Navy
B.S.M.E., University of Utah, 1968
M.B.A., University of New Haven, 1974

Porous zinc battery electrodes were modeled for study of the oxidation products that are produced during discharge in an alkaline battery. Two- and three-dimensional pore models were used in the study. The electrodes were discharged galvanostatically in electrolyte solutions of potassium hydroxide. Oxidation product morphology was studied with a scanning electron microscope. Two types of oxidation product were observed. One type appeared to form directly on the electrode surface as the result of reaction between the zinc and the electrolyte. This product was dark colored and fairly complete on passivated surfaces. The other type of product was light colored and incomplete. It appeared as a second layer, usually found on top of the darker product. This second type of product appears to precipitate out of solution at passivation. Strong pitting of the zinc base metal accompanies the production of oxidation product.

Mechanical Engineer

June 1977

Thesis Advisor: J. Perkins
Mechanical Engineering
Department

LIFT AND DRAG ANALYSIS ON THE BOW SEAL OF THE SURFACE EFFECT SHIP TESTCRAFT XR-3

Paul Allen Alfieri
Lieutenant, United States Navy
B.S. United States Naval Academy, 1969

Experimental test runs were conducted to determine the lift and drag forces acting on the bow seal of the captured air bubble testcraft XR-3. These forces were plotted versus velocity for various operating conditions.

Master Of Science In
Aeronautical Engineering
September 1977

Advisor: Donald M. Layton
Department Of
Aeronautics

IMPLEMENTATION OF A SIDELOBE BLANKING SYSTEM ON THE AN/SPS-12 RADAR

Pedro Pablo Arancibia
Lieutenant, Chilean Navy
M.S.A.E., Naval Postgraduate School, 1977

A sidelobe blanking system can be looked upon as a method for maximizing main-lobe-detection and minimizing sidelobe detection. The system is intended to provide only main-beam signals and thereby producing unambiguous bearing information.

The sidelobe blanking system turns the video off when the signal in an auxiliary antenna is stronger than the signal in the main antenna. Sidelobe blanking is best for pulse interference, and is not suitable for sidelobe noise jamming.

In order to carry out experiments with sidelobe blanking a system was implemented on the AN/UPS-1 and AN/SPS-12 radar sets.

The theory of sidelobe blanking and the design and implementation of the working circuits used is presented, together with pictures of the system and examples of the displayed signals and results.

Master of Science in
Aeronautical Engineering
March 1977

Advisor: D.B. Hoisington
Electrical Engineering
Department

A Study of Spectrum Loading and
Range-Pair Counting Method Effects
on Cumulative Fatigue Damage

John Scott Atkinson, Jr.
Lieutenant, United States Navy
B.S., Randolph-Macon College, 1968

This thesis is a study of cumulative fatigue damage. Variations in cumulative fatigue damage resulting from block loading spectra and randomized cycle loading spectra are investigated. Fatigue damage results show the merit of counting load cycles using the range-pair counting method. Complete FORTRAN computer program documentation enables this thesis to serve as a program user's manual.

Master of Science in
Aeronautical Engineering
March 1977

Advisor: G. H. Lindsey
Aeronautics Dept.

EA-6B Mission Planning Program

Carl Alan Beaudet
Lieutenant, United States Navy
B.S., Purdue University, 1971

The EA-6B Mission Planning Program is designed for use by aircrewmen deployed on board aircraft carriers. It is an interactive computer program for automated sorting, retrieval, display, and plotting of information. All decision making is done by the aircrewman. The desired goals of this program are increased mission planning efficiency and effectiveness through automation of the clerical tasks of the planning process.

Master of Science in
Aeronautical Engineering
June 1977

Thesis Advisor: H. A. Titus
Electrical Engineering
Department

An Investigation of the Recovery Processes in 7075-T651 Aluminum Responsible for a Stress Decay During Dynamic Loading Histories

Richard Allen Bentley
Lieutenant, United States Navy
B.S., Northrop Institute of Technology, 1970

This thesis investigates stress relaxation, strain softening, strain hardening and anelastic behavior as potential recovery processes in 7075-T651 aluminum alloy. A series of tests were conducted utilizing uniaxial specimens of 7075-T651 aluminum alloy as a representative aircraft structural material. The tests utilized both single and dual amplitude cyclic loading histories. The recovery mechanism felt to cause the observed stress decay was represented as an exponential decay due to an anelastic strain recovery behavior. With the data obtained, stress decay to stabilization was discussed from the analyst's and the metallurgist's point of view. By having a through knowledge of the recovery process of the structural material, it will enable the structural analyst to develop better fatigue life prediction techniques.

Master of Science in
Aeronautical Engineering
March 1977

Advisor: G. H. Lindsey
Aeronautics
Department

A MICROPROCESSOR CONTROLLED AUTOMATIC DATA LOGGING SYSTEM (ADL)

John David Casko
Lieutenant, United States Navy
B.S., Kansas University, 1970
M.S., University of West Florida, 1972

This paper describes a digital, microprocessor controlled data acquisition system which optimizes man/machine communications. The processor provides digital feedback control, data collection over any number of channels (up to 8), 32 BIT floating point (7 significant digit) mathematics, and a variety of output formats. The main features of the device are the ability to work directly in any numerical unit desired by the user, mathematical noise filtering and automatic feedback control.

The particular application under consideration is automatic data collection and angle-of-attack control of a subsonic wind-tunnel. Data are presented to demonstrate the data logging capabilities of the system.

Master of Science in
Aeronautical Engineering
June 1977

Advisor: David Caswell
Department of
Aeronautics

Temperature Dependence of Stress Concentration Factors in Composite Materials

Rene Joseph Chicoine
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1967

This thesis reports the results of an experimental investigation of the effects of temperature on the strain concentration factor due to a circular hole in a graphite/epoxy laminated composite plate subjected to tension in a principal material direction. It is shown that for the $[0/\pm 45/0]_s$ laminate tested, the strain concentration factor at 300 degrees Fahrenheit was 20% greater than the room temperature value. This variation is not predicted by classical solutions based on homogeneous orthotropic elasticity.

Master of Science in
Aeronautical Engineering
June 1977

Advisor: M. H. Bank
Aeronautics
Department

A Stability Analysis of the Proposed Circulation Control Rotor (CCR) Prototype

John Hendrix Cline
Lieutenant, United States Navy
B.S., United States Naval Academy, 1967

The rotor system of the proposed XH-2/CCR (Circulation Control Rotor) prototype aircraft and the state variable format of the airframe equations of motion are described. Through a study of the eigenvalues and eigenvectors of the basic airframe, the effects of uncoupling and cross-coupling the helicopter equations of motion were analyzed. The control matrix for the CCR was then generated using an applicable pneumatic lead angle for Coanda blowing. Feedback gains, to give the aircraft acceptable flying qualities, were calculated for the Stability Augmentation System (SAS) and finally the aircraft's sensitivity to changes in pneumatic lead angles were studied. The programs used in the above study (capable of handling up to 10x10 matrices) are listed for both the IBM-360 and HP-9830 mini-computer.

Master of Science in Aeronautical Engineering
March 1977

Thesis Advisor: L. V. Schmidt
Aeronautics Department

Ballistic Damage of Graphite-Epoxy Plates

George Arthur Eaton
Lieutenant Commander, United States Navy
B. S., United States Naval Academy, 1965

Thin eight-ply laminated graphite-epoxy plates of a representative lay-up $(0/\pm 45°/0)_S$ were damaged ballistically. The extent of damage varied with impact velocity and impactor mass. Visual and microscopic inspection was augmented by x-ray inspection utilizing a radio-opaque dye, to evaluate the extent of damage area. Specimens were then tested in tension to failure, to evaluate the residual strength. Damage "length" (in the 0° direction) varied with impact velocity, the greatest damage resulting from the lower velocities. Damage "width" (in the 90° direction) was not greatly affected by velocity changes. Variation of impactor mass had little effect. Residual strength as measured by tensile tests in the 0° direction was insensitive to damage size effects.

Master of Science in Aeronautical Engineering
June 1977

Advisor: M. H. Bank
Department of Aeronautics

Data Acquisition System for Unsteady Aerodynamic Investigation

Cleveland Duane Englehardt
Lieutenant, United States Navy
B.S.E.E., San Jose State College

This paper describes the design and implementation of a microprocessor based high-speed digital data acquisition and reduction system suitable for use in time-varying signal analysis as encountered in unsteady aerodynamic investigation. A microprocessor, flexible disk drive and an analog to digital conversion module were the main components which were integrated to form a 32 channel 12 bit resolution data acquisition system capable of 1000 Hz sampling rate and permanently storing over 250,000 bytes of data on magnetic diskette. Subsequent to the data logging process, the same system was capable of serving as a general purpose computer utilizing the popular BASIC scientific programming language.

The system was qualified for accuracy and functional performance through a series of controlled exercises, and was then applied to an actual investigative task to further determine its utility and value.

Master of Science in
Aeronautical Engineering
June 1977

Advisor: Louis V. Schmidt
Department of Aeronautics

Evaluation of and Operational Procedures
for a Helicopter Simulation System
Utilizing an Integrated Electronic
Instrument Display

William Woodrow Fetzer, Jr.
Lieutenant, United States Navy
B.S., United States Naval Academy, 1970

This report discusses the evaluation and documentation of an integrated electronic instrument display designed to investigate stability and control of a helicopter during precision hover operations. The equations of motion, developed from the Kaman SH-2F Seasprite helicopter, were implemented by a hybrid computer system and displayed by a graphics processor. A complete procedural checklist, including troubleshooting methods, is included in this report. This helicopter simulation system can be used for further research in the development of optimal heads-up display configurations as well as analyses of instability caused by pilot induced oscillations in the hover flight regime.

Master of Science in
Aeronautical Engineering
June 1977

Advisor: Donald M. Layton
Department of
Aeronautics

A Personalized System of Instruction for Aircraft Performance

Donald Leslie Finch
Lieutenant Commander, United States Navy
B.S.E.E., Purdue University, 1965

A personalized system of instruction utilizing self-contained text material and combining the principle of auto-tutorial instruction with modified self-pacing was developed for a course in aircraft performance. The course material, contained in Appendix A, was applied to the aircraft performance portion (six weeks) of a 12 week course in aircraft performance, control and stability taught to 11 students in the Department of Aeronautics at the Naval Postgraduate School, Monterey, California, during the summer quarter of 1976. The course results, summarized in Appendix B and C, tended to confirm the advantages and substantial value of this instructional method.

In addition, the course material will be utilized by the Office of Continuing Education, Naval Postgraduate School, Monterey, in its program of offering basic background courses off campus in preparation for graduate study.

Master of Science in Aeronautical Engineering
March 1977

Advisor: Donald M. Layton
Department of Aeronautics

A STUDY OF PULL-THROUGH FAILURES

of

MECHANICALLY FASTENED JOINTS

Robert N. Freedman
Lieutenant, United States Navy
B.A., Miami University, 1970

The relationship between the bending moment and the through-plane shear force in the vicinity of a mechanical fastener at failure was determined. Experiments were conducted on 4-inch wide flat plate aluminum and graphite-epoxy composite specimens that modeled portions of a wing skin along a spar and along a rib. The composite specimens were either 8-ply or 16-ply balanced layups and were simply supported at two opposing edges and free along the other two edges. The fasteners were pulled normal to the plates, and the maximum force at failure was measured for specimen lengths varying from two to six inches between supports.

The aluminum plates failed by formation of a plastic hinge across their width and showed little sensitivity to through-plane shear. The 8-ply spar specimens cracked across their width and also were relatively insensitive to through-plane shear. However, failures of the rib specimens were confined to a region near the fastener, where the fastener pulled through the plate, and showed much greater sensitivity to through-plane shear.

Two analyses were made; one for small elastic deflections of a thin orthotropic plate, and another for a beam in the elastic range. A mesh generator for a finite element model of the plate around the fastener was also developed for the computer program ADINA.

Master of Science in
Aeronautical Engineering
September 1977

Advisor: R. E. Ball
Department of Aeronautics

An Investigation of Methods for Determining
Notch Root Stress from Far Field Strain
in Notched Flat Plates

John Charles Garske
Lieutenant, United States Navy
B.S., University of Idaho, 1969

Notched flat plate specimens have been tested to examine Neuber's equation and other relations with respect to their application in the determination of stresses in the plastic range at the notch root when the far field strain is known. A nonlinear finite element solution has also been obtained for notched flat plates in plane stress to facilitate an evaluation of it as an analytical method for calculating the behavior of stresses at the notch root.

Experimental results indicate that Neuber's equation is ten to twenty-five percent in error for the notch geometry, strain level and material behavior encountered in the present study. Finite element analysis results were in close agreement with experimental results.

Master of Science in
Aeronautical Engineering
September 1977

Advisor: G. H. Lindsey
Department of
Aeronautics

Wind Tunnel Wall Corrections for Arbitrary Planforms and Wind Tunnel Cross-Sections

Chester Arthur Heard
Lieutenant, United States Navy
B.A., Southwestern at Memphis, 1969

A computer program was developed to obtain the wind tunnel wall corrections for wing angle of attack, induced drag, and pitching moment in incompressible flow. The vortex lattice method is used for computation of these correction factors. The program can be applied to wind tunnels of arbitrary cross-sectional shape, and wings of any desired planform, subject to the constraint of straight leading and trailing edges.

Master of Science in Aeronautical Engineering
June 1977

Thesis Advisor: L.V. Schmidt
Aeronautics Department

Design, Construction and Testing of a Sub-scale Turbojet Test Cell

Holden Willets Hewlett
Lieutenant Commander, United States Navy
B. S., United States Merchant Marine Academy, 1966

A one-eighth scale turbojet test cell was designed and constructed and initially operated to determine facility characteristics.

Experiments were then conducted to determine engine operating characteristics, inlet velocity profiles and cell pressure profiles for two augmentor-to-engine spacings. Experimental data were compared to existing computer model predictions and showed qualitative agreement. Recommendations are made for facility improvements.

Master of Science in
Aeronautical Engineering
March 1977

Advisor: David W. Netzer
Department of
Aeronautics

Development of Materials For a New Course In the
Fundamentals of Nonnuclear Aircraft Combat Survivability

Karl Otto Krumbholz
Lieutenant, United States Navy
B.S., United States Naval Academy, 1968

This document consists primarily of materials that have been developed for the text "Fundamentals of Aircraft Combat Survivability". This text will be expanded by further research and will ultimately serve as the text for a lecture course entitled "The Fundamentals of Aircraft Weapons Systems Survivability/Vulnerability" to be taught at the Naval Postgraduate School.

Master of Science in
Aeronautical Engineering
June 1977

Advisor: Robert E. Ball
Department of Aeronautics

Initial Unsteady Aerodynamic Measurements
of A Circulation Controlled Airfoil and an
Oscillating Flow Wind Tunnel

Emmett John Lancaster
Lieutenant, United States Navy
B.S., United States Naval Academy, 1970

Steady state results of lift developed by varying the momentum blowing coefficient (C_μ) upon a refurbished Circulation Control Rotor (CCR) airfoil section were favorable. This thesis was an experimental investigation to quantitatively evaluate whether the steady state results could be applied by a quasi-steady assumption when a harmonic perturbation of C_μ was superimposed upon the steady value. Results suggested an attenuation in the dynamic transfer function of dC_p/dC_μ as the oscillating blowing frequency was increased.

The oscillating flow wind tunnel in which the CCR airfoil section was tested exhibited a relationship between pressure and velocity amplitude not in accordance with quasi-steady small perturbation theory. Initial measurements indicated that the RMS C_p perturbation was an order of magnitude greater than the normalized RMS velocity perturbation. To further clarify this situation, investigations were conducted to establish a dynamic frequency response calibration of the wind tunnel. Results confirmed the order of magnitude difference between the RMS C_p and normalized RMS velocity perturbations, indicating that the tunnel flow environment was governed by Euler's equation in its complete form rather than with the simplifications which lead to the quasi-steady small perturbation theory.

Master of Science in
Aeronautical Engineering
June 1977

Advisor: L. V. Schmidt
Department of
Aeronautics

UNSTEADY EFFECTS ON THE MEASUREMENT OF TOTAL PRESSURE IN ROTATING MACHINES

Vernon James Larson
Lieutenant, United States Navy
B.S., Oregon State University, 1968

The pressure averaging of different pneumatic impact probes was investigated using a periodic flow generator in order to establish corrections for probe measurements made in a compressor, and to guide in the selection of probe geometries to be used in the compressor. The Kulite transducer probe used as a reference in these measurements was also used, with both continuous and synchronized sampling, to measure the flow from the compressor rotor. It was concluded that the corrections required to be made to the pneumatic impact pressure measurements were negligible at 50% design speed, but might be significant at higher speeds if the probe system volume were not properly sized.

Master of Science in
Aeronautical Engineering
September 1977

Advisor: Raymond P. Shreeve
Department of Aeronautics

DISSECTION AND ANALYSIS OF ELECTROENCEPHALOGRAMS OF SUBJECTS DOING A SIMULATED PILOT'S TASK

Daniel Floyd Lashbrook
Lieutenant, United States Navy
B.S.M.E., University of Oklahoma, 1970

A method for dissecting and analyzing electroencephalograms for the presence of any distinctive characteristics is presented. Data are presented which strongly indicate the presence of a preferred frequency, in the 70 - 95 Hz range, that is a characteristic of the performance of a simulated aircraft pilot's task. A conclusive test for the presence of wideband noise in the EEG is presented with data to show that wideband noise is a characteristic of myograms. EEGs taken from two closely spaced electrodes located over the motor and premotor areas of the cortex show that tegules in the 70 - 95 Hz band are not simultaneous with the tegules of any other band, except by chance.

Master of Science in Aeronautical Engineering
March 1977

Advisor: George Marmont
Department of Electrical Engineering

Generalized Helicopter Rotor Performance Predictions

James William Loiselle
Lieutenant, United States Navy
B.S., United States Naval Academy, 1971

The Generalized Rotor Performance (GRP) program is a computer program designed for calculating forward flight performance of a helicopter rotor system at a specific flight condition. It can be used to evaluate either an articulated or a hingeless single rotor system in forward flight or in a wind-tunnel test. The program was originally designed by the Sikorsky Aircraft Company and purchased by the United States Navy.

The goals of this thesis were (1) to reinvestigate the theory and logic used in the program, (2) to add selected desirable features to the program, (3) to produce a much needed Users' Manual, and (4) to run an analysis comparing the program's calculated results against manufacturer's data. These goals were accomplished and the results of the analysis indicated that the program produces highly accurate results within the normal cruise range of a modern helicopter.

Master of Science in
Aeronautical Engineering
September 1977

Adviser: Louis V. Schmidt
Department of
Aeronautics

Effect of Configuration Variables on Performance of Solid Fuel Ramjets

Clemens James Mady, Jr.
Lieutenant, United States Navy
B.S., United States Naval Academy, 1970

An experimental investigation into the effect of configuration variables on combustion performance in the solid fuel ramjet was conducted. The effect of air ducting methods on combustion efficiency was found to be dependent not only on the flow rates, momentum and geometry of the system but also on the composition of the solid fuel. High pressures and low air mass fluxes through the fuel grain affect the regression rate by altering the heat transfer mechanism. Some air duct configurations were found to create a favorable environment for combustion pressure oscillations.

Master of Science in
Aeronautical Engineering
June 1977

Advisor: David W. Netzer
Aeronautics
Department

INVESTIGATION OF A LINEAR, TWO-DEGREE-OF-FREEDOM SIMULATION OF THE XR-3 CAPTURED AIR BUBBLE (CAB) CRAFT IN THE FREQUENCY DOMAIN

Lewis Frank McIntyre
Lieutenant
Bachelor of Science

A simplified two-degree-of-freedom simulation in heave and pitch of the XR-3 Captured Air Bubble (CAB) testcraft is developed first in a non-linear form and is subsequently linearized about the steady-state operating point. The model is validated against the six-degree-of-freedom XR-3 Loads and Motions program in the time domain; the linear system is then transformed into the frequency domain by complex matrix inversion. A comparison is made between the linear system frequency response predicted by the two-degree-of-freedom model and that of the Loads and Motions program, as well as actual testcraft data, reduced to the frequency domain by a Fast Fourier Transform (FFT) technique. This comparison of frequency response curves highlights a non-linear mode of CAB craft behavior of possible interest to habitability and seaworthiness studies.

Master of Science in
Aeronautical Engineering
June 1977

Advisor: Alex Gerba, Jr.
Department of
Electrical
Engineering

POWER-DENSITY DISTRIBUTION BELOW THE OCEAN SURFACE DUE TO INCIDENT LASER RADIATION

Michael John Milchanowski
Lieutenant, United States Navy
B.S., United States Naval Academy, 1969
M.S., University of West Florida, 1971

The time-averaged power-density distribution below the ocean surface due to incident laser radiation is examined by means of computer simulation of the geometrical optics involved with the air/sea interface and subsequent ocean penetration by the laser beam. The effects over the entire spectra of incidence angles, wind velocities, wind directions, beam spot sizes and depths of penetration are analyzed.

Master of Science in
Aeronautical Engineering
March 1977

Advisor: D. J. Collins
Department of
Aeronautics

A STATE-OF-THE-ART ASSESSMENT OF AIR DATA SENSORS FOR NAVAL AIRCRAFT

Robert Dale Neil
Lieutenant, United States Navy Reserve
B.S. Niagara University, 1970

A review of current air data measurement techniques in Naval aircraft was conducted. Future requirements were identified for three classes of aircraft: conventional, fly-by-wire, and V/STOL. A survey of state-of-the-art air data sensors was performed based on information obtained from current literature, correspondence, and personal interviews with major government contractors, government agencies, and private companies. The major areas covered include pressure, airspeed, fiber optics, laser gyros, temperature, and fuel quantity. The basic operation of each system considered was presented and recommendations given based on its present stage of development and potential.

Master Of Science In
Aeronautical Engineering
September 1977

Advisor: Donald M. Layton
Department Of
Aeronautics

Time Integration of Unsteady Transonic Flow to a Steady State Solution by the Finite Element Method

Raymond John Nichols Jr.
Lieutenant, United States Navy
B.S., Pennsylvania State University, 1970

A finite element method was applied to the unsteady transonic small disturbance equation and integrated until the solution converged to the steady state for a thin non-lifting airfoil. The method of weighted residuals was used to formulate the finite element equations and Houbolt's method of central differencing in time was used to integrate these equations.

A secondary investigation applied the steady transonic small disturbance equations to a converging-diverging nozzle.

Master of Science in
Aeronautical Engineering
March 1977

Advisor: D. J. Collins
Department of
Aeronautics

Data Reduction for the Unsteady Aerodynamics
on a Circulation Control Airfoil

Billy Murel Pickelsimer
Lieutenant, United States Navy
B.S., Oklahoma State University, 1970

Calculating the lift, drag, and pitching moment coefficients for an airfoil from the static pressure distribution obtained from wind tunnel tests is routine task when steady flow is considered, but it is much more complicated when the airfoil is operating in an unsteady flow field, similar to that experienced by a helicopter rotor blade, produced by an oscillating wind tunnel. A data reduction routine capable of condensing the large numbers of data associated with the unsteady investigation, as well as a numerical integration algorithm for the unsteady aerodynamic coefficients, were developed; however, no unsteady data were collected due to hardware failures. The ability of the program was demonstrated on previously obtained steady and quasi-steady data and sample results were presented.

Master of Science in
Aeronautical Engineering
March 1977

Advisor: Louis V. Schmidt
Aeronautics
Department

A MATHEMATICAL MODEL FOR THE LONGITUDINAL CONTROL SYSTEM OF THE SPACE SHUTTLE ORBITER

Cole Jon Pierce
Lieutenant Commander
United States Navy
A.B., Knox College, 1963

The analysis of a fly-by-wire longitudinal control system, specifically that of the space shuttle orbiter, was undertaken in order to demonstrate the construction of a mathematical model depicting the relationships between forcing function and response. Each facet of modern control theory, including stability, was developed. Several computer programs were written, which should be of value to the Department of Aeronautics, for the HP9830 computer/plotter; these programs are basic to the study of control theory, demonstrate the importance of the transfer function, the characteristic equation, and the various forms of feedback, and will plot time and frequency (Bode) response graphs given the proper inputs. The Continuous System Modeling Program, version III, and the IBM360 were used to analyze the complex control system installed in the orbiter. The demonstration of the model and its interface with the CSMP program was given, and the efficiency of this procedure was made clear.

Master of Science in
Aeronautical Engineering
March 1977

Advisor: Daniel J. Collins
Department of
Aeronautics

ENERGY MANAGEMENT DISPLAY FOR AIR COMBAT MANEUVERING

Stuart Robinson Powrie
Lieutenant, United States Navy
B. S., United States Naval Academy 1970

A skill and task analysis of air combat maneuvering was performed. This analysis indicated that a device to aid the pilot to maneuver the aircraft to its aerodynamic limits might be useful, but such a device might be ineffective due to a high level of sensory saturation. The concept for design of the project was predicated upon projected use of future displays for fighter aircraft in air combat maneuvering, pilot training and flight safety aspects. The test energy maneuverability display was designed using a microprocessor for dedicated control. The display format was based on color coding various specific power regions and presenting them in the pilot's peripheral vision. An experiment was designed and executed to determine if the pilot could respond to the specific power color codes and maintain performance of critical pilot tasks. An analysis of test variance indicated no significant degradation of pilot performance with the introduction of color coding to the peripheral vision.

Master of Science in
Aeronautical Engineering
March 1977

Advisor: D. M. Layton
Department of
Aeronautics

Design Study of a Centerplate Mount for Wind Tunnel Models

Robert Wayne Russell
Lieutenant, United States Navy
B.S.A.E., Purdue University, 1971

A three-strut wind-tunnel model support system was being used with an electrical balance in the 3.5 by 5.0 foot Department of Aeronautics low-speed wind tunnel. The traditional method of image systems and alternate inverted mounting for the evaluation of aerodynamic tares was considered impractical for implementation in the small sized tunnel. The design and installation of an alternate model support system using a centerplate mount was accomplished. An aerodynamic evaluation for comparing the two model mounting concepts was performed via experiments with a single calibration wing. Additionally, these experiments were the first operational exercise of a recently developed microprocessor data acquisition system.

Master of Science in
Aeronautical Engineering
June 1977

Advisor: L. V. Schmidt
Aeronautics
Department

Wing Rock as a Lateral-Directional Aircraft Limit Cycle Oscillation Induced by Nonlinear Aerodynamics Occurring at High Angle of Attack

Paul David Young
Major, U.S. Marine Corps
B.S., Chemistry, Oklahoma State University, 1964

Wing rock at high angle of attack is an oscillatory lateral-directional motion phenomenon known to exist in some of today's high performance tactical aircraft. The motion has been consistently characterized as a lightly damped Dutch-Roll oscillation attributable to asymmetric wing stall. However, evidence gathered from wind tunnel simulations and at least one British study indicate that aerodynamic nonlinearities may be the source of wing rock. Regardless of the actual cause of the phenomenon, a study of wing rock has positive ramifications with respect to gaining a clearer understanding of the aerodynamics associated with high angle of attack flight. This report presents the results of an investigation of wing rock which centered on the premise that two distinct nonlinear aerodynamic mechanisms (aerodynamic hysteresis and a cubic nonlinearity in yawing moment) not only can cause wing rock but may drive it to a limit cycle oscillation as well.

Master of Science in Aeronautical Engineering
June 1977

Advisor: L. V. Schmidt
Department of Aeronautics

BALLISTIC CHARACTERIZATION OF ULTRA-HIGH CARBON STEEL

William Hayes Goesling
Lieutenant Commander, United States Navy
B.A., University of Montana, 1963

Thermomechanical processing of Ultra-High Carbon Steels (UHCS), containing one to two percent carbon by weight, has led to the development of microstructures consisting of very finely spheroidized cementite particles in a fine grained ferrite matrix. These steels possess a unique combination of mechanical properties: high strength with high toughness, superplasticity at elevated temperatures, and the capacity to be heat treated to high hardness. This unusual combination of characteristics led to a research effort which was directed toward the evalution of these low-cost, iron-carbon alloy steels as potential armor materials. The evaluation was completed utilizing the methodology of systems engineering.

Ballistic characterization of these steels was conducted employing a modified five-wire ballistic pendulum. A low-cost, highly-accurate, photovoltaic-diode system was designed and constructed to measure pendulum displacements during impact events. Target specimens of UHCS were ballistically tested using 17 grain, 22-caliber fragment-simulating projectiles at 0^{o} obliquity, with current armor materials also tested for comparison. The results of this analysis indicate that UHCS exhibits ballistic characteristics that are cost effective compared to those of present-day armor materials, while possessing superior nonballistic properties.

Master of Science in Applied Science Advisors: T.R. McNelley
Master of Science in Management M. B. Kline
September 1977

Emulation of the AN/UYK-20 Tactical Data Computer on the Burroughs D-machine

Ralph Harry Anzelmo
Captain, United States Marine Corps
B.A., Montclair State College, 1968

Theodore Lawrence Kaye
Lieutenant, United States Navy
B.S.S.E., United States Naval Academy, 1972

A representation of the Univac AN/UYK-20 computer system has been emulated on the Burroughs D Interpreter-Based System. The entire AN/UYK-20 instruction repertoire has been emulated with the exception of the 'math pac' option (floating point arithmetic and cordic functions), clock and interrupt codes, and input/output operation codes. Modular design with extensive documentation has been implemented throughout program development allowing for ease of modification and further extensions to the existing emulation. Emulation and the hardware architecture of the AN/UYK-20 and the Burroughs D-machine, are discussed in conjunction with the AN/UYK-20 itself. Methods of testing and debugging, sample test programs and recommendations for continued design modifications to the emulation are presented.

Master of Science
in Computer Science
March 1977

Advisor: LT Lyle V. Rich, SC, USN
Computer Science Dept.

A SHARED ENVIRONMENT FOR MICROCOMPUTER SYSTEM DEVELOPMENT

Kenneth J. Brown
Captain, United States Marine Corps
B.A., California State College Fullerton, 1968

David R. Bullock
Lieutenant, United States Navy
B.A., State University of New York College at Oneonta, 1968

A timeshared microcomputer monitor for Intel 8080 microprocessor systems development has been described. Running on the Sycor 440 Clustered Terminal Processing System, the monitor provides a virtual environment composed of a console device, eight floppy disk drives, and an 8080 microprocessor for up to four concurrent users. Virtual floppy disk files on a five megatype movable-head disk provide the systems's primary auxiliary storage medium. Three different levels of access protection are available for these virtual floppy disk images. A command language processor has been included to support on-line modification of the virtual environment. System recovery in the event of a hardware or software failure is also supported by the monitor.

Master of Science in
Computer Science
March, 1977

Advisor: G.M. Raetz
Computer Science
Department

Parallel Processing of Recursive Functions

Franklin Burkhead
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1966

Algorithms defined as recursive functions, such as in "pure" LISP, are shown to have structure sufficient to distinguish between processes which must be executed in sequence and processes which may be executed in parallel.

An interpreter program is presented for executing LISP programs and simultaneously computing the number of processors needed at each step of program execution in order to achieve optimum parallel processing. Sample program runs are presented to show speed-up ratios between strictly sequential and optimally parallel executions.

A possible hardware organization for a parallel processing system derived from the interpreter program is presented.

Master of Science in
Computer Science
June 1977

Advisor: G. A. Kildall
Computer Science
Department

A CASE STUDY IN MAN MACHINE CONVERSATIONAL INTERACTION

Robert Dagwell Cloyes Jr.
Lieutenant Commander, United States Navy
B.A., University of California Riverside, 1965

and

Richard Joseph Muller
Major, United States Marine Corps
B.S., United States Naval Academy, 1966

This project studied the currently available interactive graphics devices which may be utilized within an educational environment and examined the human behavior patterns required for effective man/machine conversation. The feasibility of an applicable documentation effort was explored and a user interface for the Naval Postgraduate School Computer Laboratory was developed.

Master of Science in
Computer Science
June 1977

Advisor: George A. Rahe
Computer Science
Department

The development of a CUBUL "Calculator" for High-performance bit-slice Microprocessors

Elizabeth K. Conley
Lieutenant, United States Navy
B.A., Manhattanville College, 1971
and
Ronald W. Modes
Lieutenant, United States Navy
B.S., University of Utah, 1971

The design of a CUBUL editor and interpreter is explored which uses simple, straightforward algorithms similar to the approach found in programmable calculators. The algorithms are designed to be implemented using the microinstructions of a high-performance bit-slice microprocessor. A possible machine design using a family of microprogrammable four-bit-slice bipolar circuits is outlined.

Master of Science in Computer Science
September, 1977

Advisor: Gary A. Kildall
Computer Science
Department

MICRO-COBOL
AN IMPLEMENTATION OF
NAVY STANDARD HYPO-COBOL
FOR A MICROPROCESSOR-BASED COMPUTER SYSTEM

Alan Scott Craig
Captain, United States Marine Corps
B.S., Brigham Young University, May 1971

A compiler for ADPESO standard HYPO-COBOL has been implemented on a microcomputer. The implementation provides nucleus level constructs and file options from the ANSII COBOL package along with the PERFORM UNTIL construct from a higher level to give increased structural control. The language was implemented through a self-hosted compiler and run-time package on an 8080 microcomputer-based system. Both compiler and interpreter can be executed in 12K bytes of user storage.

Master of Science in
Computer Science
March 1977

Advisor: Gary A. Kildall
Computer Science
Department

An Interactive, Incremental Assembly Language Processor For The INTEL 8080

John L. Cuzzocrea
Lieutenant, United States Navy
B.S., Oklahoma University, 1971

Michael Charles Thomas
Lieutenant, United States Navy
B.S., Oregon State University, 1970

The design and implementation of an interactive incremental assembly system on an INTEL 8080-based microcomputer has been described. Instead of requiring separate editing, assembling and debugging steps, the system allows entry, translation and error checking simultaneously. The implementation is comprised of an integrated set of modules which assemble and execute the source code. The design goals, solutions, and recommendations for further expansion of the system have been presented. The system was implemented in PL/M for use in a diskette-based environment.

Master of Science in
Computer Science
June 1977

Advisor: V. M. Powers
Computer Science
Department

A Program Development System for the Burroughs D-machine

Thomas Richard Dalton
Captain, United States Marine Corps
B. S., United States Naval Academy, 1971

The notion of a program development system is defined. Design concepts for a program development system and the required primitives are discussed. Guidelines for coordination and evaluation of a program development system as a total system are presented. An implementation and evaluation of a program development system for the Burroughs D-machine is also presented.

Master of Science in
Computer Science
June 1977

Advisor: Gerald L. Barksdale, Jr.
Computer Science
Department

An Adaptation of the Hershey Digitized Character Set For Use In Computer Graphics and Typesetting

Patrick Michael Doyle
Lieutenant, United States Navy
B.S., United States Naval Academy, 1971

Font definitions of 1377 characters of various styles developed by Allen V. Hershey were used as an initial data base. His character definitions were first put into a form suitable for use by vector graphics display processors, and then these vectors were converted into dot matrix form in a variety of point sizes. This conversion and digitization process was done using the C programming language; the host computer was a PDP-11/50 with the UNIX operating system, and the computerized typesetting was done on a VERSATEC 1200-A printer/plotter.

As a result, a large data base for use in computerized typesetting has been developed. In addition, the computerized typesetting system at the Naval Postgraduate School has been improved and adapted to make use of the large number of fonts now available.

Master of Science in Computer Science
June 1977

Advisor: Gerald L. Barksdale, Jr.
Computer Science
Department

A SIMULATION MODEL FOR THE STUDY OF JOB SCHEDULING POLICY

ERIK FIEGL
Kapitaenleutnant, Federal German Navy

A job scheduling simulation model was produced for the purpose of developing an effective Initiator usage policy. While the first part of the study gives a detailed overview of the structure of the OS/MVT Job Management routines the parts thereafter are devoted to describing the simulation model and to an analysis of Naval Postgraduate School Computer Center operational data. A user's manual, a demonstration run with results, and a program listing of the simulation model are included.

Master of Science in
Computer Science
June 1977

Advisor: N.F. Schneidewind
Computer Science
Department

ALGOL-M
AN IMPLEMENTATION OF A HIGH-LEVEL BLOCK STRUCTURED LANGUAGE FOR A MICROPROCESSOR-BASED COMPUTER SYSTEM

John P. Flynn
Lieutenant Commander, United States Navy
B.S., United States Naval Academy, 1965

and

Mark S. Moranville
Lieutenant, United States Navy
B.S., Oregon State University, 1972

The design and implementation of the ALGOL-M programming language for use on a microprocessor-based system is described. The implementation is comprised of two subsystems, a compiler which generates code for a hypothetical zero-address machine and a run-time monitor which executes this code. The system was implemented in PL/M to run on an 8080 microcomputer in a diskette-based environment with at least 20K bytes of user storage.

Master of Science in
Computer Science
September 1977

Advisor: Gary A. Kildall
Computer Science
Department

A Study of The P-3C Omega Navigation System

James Joseph Frydrychowicz
Captain, United States Marine Corps
B.S., Northern Illinois University, 1967

This thesis is a study of the Omega navigation system as currently implemented in the P-3C aircraft. The possibility of using a microcomputer to solve the internal processing functions is investigated. Data flow graphs were applied to the velocity and navigation processing function in the Omega system. These graphs assisted in the development of the PL/M code which implements the function. The four PL/M subroutines that were written can compute the velocity and navigation equations in sufficient time and with sufficient accuracy to encourage additional research into a microcomputer implementation of the remaining internal functions of the Omega system.

Master of Science in
Computer Science
June 1977

Advisor: Uno R. Kodres
Computer Science
Department

A Microcomputer Based Generator

of

Recurring Operational Reports

John Bartlett Godley
Lieutenant Commander, United States Naval Reserve
B.S., New Mexico State University, 1964

This thesis proposes a Report Originating System to provide afloat and small commands with the capability of automatic data processing assistance in report generation. The discussed system is completely implementable in small, inexpensive general purpose microcomputer hardware. The principal benefit of the system lies in its ability to prompt the user to solicit the information required to be submitted in the report and to partially analyze the user's responses for correctness of form and content. Such computerized assistance should result in higher report quality and the concomitant reduction of correcting message traffic. The Report Originating System incorporates a line editing capability which lends itself to any text editing process. Thus, frequently modified locally prepared documents such as unit instructions and directives can be originated and updated with this system.

Master of Science in
Computer Science
June 1977

Advisor: Stephen L. Holl
Computer Science
Department