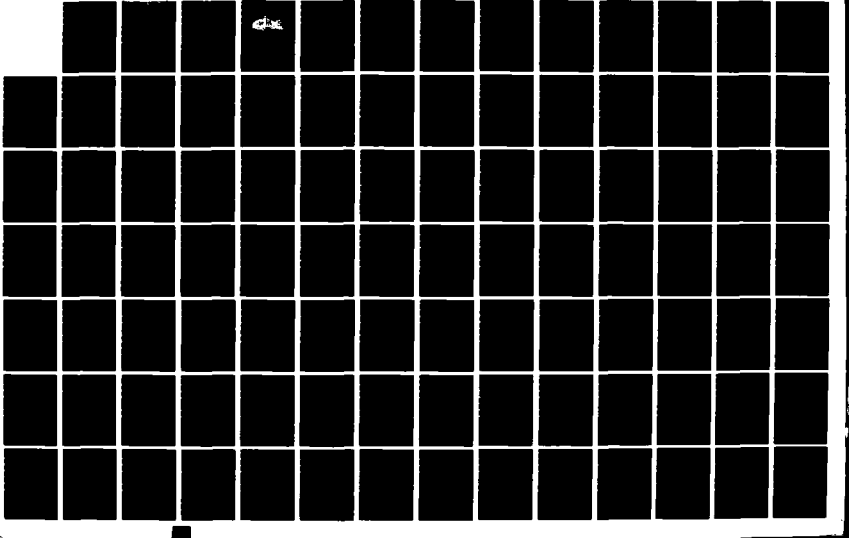
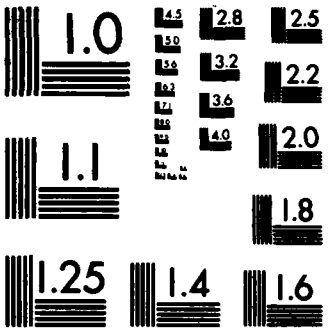
AD-A154 299 USAF/SCEEE GRADUATE STUDENT SUMMER RESEARCH PROGRAM (1984) PROGRAM MANAGE..(U) SOUTHEASTERN CENTER FOR ELECTRICAL ENGINEERING EDUCATION INC S.. 1/2

UNCLASSIFIED W D PEELE ET AL. OCT 84 AFOSR-TR-85-0475 F/G 5/1 NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

AFOSR-TR-

(2)

AD-A154 299

DTIC FILE COPY

1984 MANAGEMENT REPORT

SCEEE PROGRAM DIRECTORS

WARREN D. PEELE

EARL G. TEEL

DTIC ELECTE S D

85 5 28 106

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

A154 299

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION: UNCLASSIFIED	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION/AVAILABILITY OF REPORT: APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE	
4. PERFORMING ORGANIZATION REPORT NUMBER(S)	5. MONITORING ORGANIZATION REPORT NUMBER(S): AFOSR-TR- 85-0475
6a. NAME OF PERFORMING ORGANIZATION: Southeastern Center for Electrical Engineering Education; 6b. OFFICE SYMBOL (If applicable)	7a. NAME OF MONITORING ORGANIZATION: Air Force Office of Scientific Research/XOT
6c. ADDRESS (City, State and ZIP Code): 11th & Massachusetts Ave: St. Cloud, FL 32769	7b. ADDRESS (City, State and ZIP Code): Building 410 Bolling AFB, DC 20332-6448
8a. NAME OF FUNDING/SPONSORING ORGANIZATION: AFOSR; 8b. OFFICE SYMBOL (If applicable): XOT	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER: F49620-82-C-0035
8c. ADDRESS (City, State and ZIP Code): Building 410 Bolling AFB, DC 20332-6448	10. SOURCE OF FUNDING NOS.

PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.	WORK UNIT NO.
61102F	2301	D5	

11. TITLE (Include Security Classification): United States Air Force Graduate Student Summer Research Program (1984) Management Report

12. PERSONAL AUTHOR(S): Warren D. Peele, Earl L. Steele, Major Amos L. Otis

13a. TYPE OF REPORT	13b. TIME COVERED	14. DATE OF REPORT (Yr., Mo., Day)	15. PAGE COUNT
FINAL	FROM _____ TO _____	October 1984	

16. SUPPLEMENTARY NOTATION

17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB. GR.	

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

A pilot program for the Graduate Student Summer Research Program (GSSRP) was initiated by contract modification to the AFOSR Summer Faculty Research Program (SFRP) on 26 March, 1982. The program was developed as an adjunct effort to the SFRP. Its purpose is to provide funds for selected graduate students to do research at an appropriate Air Force laboratory or center with a supervising professor who holds a concurrent SFRP appointment. In the 1982 pilot program, SCEEE appointed 17 graduate students representing 15 schools and 10 disciplines in science and engineering . In 1983 the program was expanded to 53 students representing 36 schools and 18 disciplines. The 53 participants were selected from 117 applicants. In 1984 we had 112 applicants and made 84 graduate student appointments.

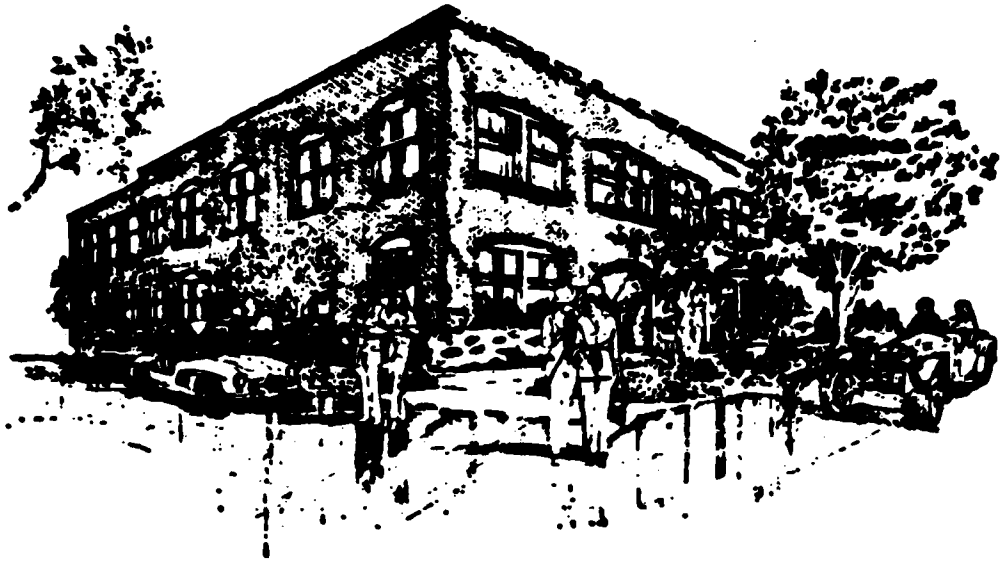
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT	21. ABSTRACT SECURITY CLASSIFICATION
UNCLASSIFIED/UNLIMITED ☑ SAME AS RPT. ☐ DTIC USERS ☐	UNCLASSIFIED

22a. NAME OF RESPONSIBLE INDIVIDUAL	22b. TELEPHONE NUMBER (Include Area Code)	22c. OFFICE SYMBOL
MAJOR AMOS L. OTIS	(202) 767-4971	XOT

DD FORM 1473, 83 APR EDITION OF 1 JAN 73 IS OBSOLETE.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE



SCEEE
©
1984

1984 USAF/SCEEE

GRADUATE STUDENT SUMMER RESEARCH PROGRAM

Conducted by

Southeastern Center for

Electrical Engineering Education

under

USAF Contract Number F49620-82-C-0035

PROGRAM MANAGEMENT REPORT

Program Directors, SCEEE
Warren D. Peele
Earl L. Steele

Program Manager, AFOSR
Major Amos L. Otis

Submitted to

Air Force Office of Scientific Research

Bolling Air Force Base

Washington D.C.

by

Southeastern Center for
Electrical Engineering Education

October 1984

TABLE OF CONTENTS

Note: Complete technical reports on the Graduate Student Research are published in two supplementary technical report volumes.

INTRODUCTION & HISTORY

A pilot program for the Graduate Student Summer Research Program (GSSRP) was initiated by contract modification to the AFOSR Summer Faculty Research Progam (SFRP) on 26 March 1982. The program was developed as an adjunct effort to the SFRP. Its purpose is to provide funds for selected graduate students to do research at an appropriate Air Force laboratory or center with a supervising professor who holds a concurrent SFRP appointment. In the 1982 pilot program, SCEEE appointed 17 graduate students representing 15 schools and 10 disciplines in science and engineering. In 1983 the program was expanded to 53 students representing 36 schools and 18 disciplines. The 53 participants were selected from 117 applicants. In 1984 we had 112 applicants and made 84 graduate student appointments.

To be eligible, all candidates had to be currently registered in a graduate program. The graduate students were selected from the fields of engineering, computer science, mathematics, or the physical sciences. They were supervised by a faculty member who held an appointment as a SCEEE Fellow for the summer of 1984 under the Summer Faculty Research Program or an Air Force laboratory designated colleague. The students were U.S. citizens, working toward an appropriate graduate degree, and currently enrolled in the graduate school at their respective institutions.

The graduate student researchers in this program had the following specific obligations:

1) To participate in research under the direction of a faculty member or Air Force supervisor at an Air Force laboratory or center;
2) To prepare a report at the end of the summer period describing the summer research accomplishments. The report must have been approved by or co-authored with the supervising faculty member or Air Force supervisor;
3) To complete an evaluation questionnaire on the Graduate Student Summer Research Program.

1984 GSSRP OBJECTIVES: (1) To provide a productive means for a graduate student to participate in research under the direction of a faculty member or an Air Force designated supervisor at an Air Force laboratory or center; (2) to stimulate continuing professional association among graduate students, the supervising professors, and professional peers in the Air Force; and (3) to enhance the research productivity and capabilities of engineering and science graduate students.

PREREQUISITES FOR APPOINTMENTS: To qualify as a graduate researcher in the 1984 GSSR Program, applicants must be: (1) U.S. citizens; (2) holders of a B.S. or M.S. degree in an appropriate technical specialty; (3) registered in a graduate school working toward an appropriate graduate degree; and (4) willing to pursue their summer research work under the direction of a supervising professor who holds an appointment under the SFRP for the summer of 1984 or an assigned Air Force supervisor.

RESEARCH PERIOD: The period of the student appointments was for ten continuous weeks at the research site between May 1, 1984 and September 30, 1984. The student's research period coincided with the appointment period of the supervising professor with whom the student worked.

APPLICATION DEADLINE: April 15, 1984

FINANCIAL TERMS: Stipends for graduate student researchers were paid as follows:

$55.00 per day ($275 per week) for B.S. degree holders;
$65.00 per day ($325 per week) for M.S. degree holders.

Travel expenses were reimbursed to the student for round trip travel between the researcher's school location and the Air Force facility in accordance with SCEEE travel policy. A living expense allowance of $25.00 per day was paid for each day the researcher spent at the Air Force location.

Evaluations have been requested of the laboratory contacts and all have responded in writing or verbally. The common opinions among government laboratory scientists, faculty, and students are:

(a) That the program is a valuable addition to the Summer Faculty Research Program;
(b) That the program should be continued;
(c) That students should be supervised by faculty researchers;
(d) That the students are highly motivated and contribute significantly to the research effort;
(e) That exposure to USAF R&D produces a positive student opinion of the USAF.

This report contains detailed and summarized data relevant to the 1984 Graduate Student Summer Research Program.

INFORMATION BROCHURE

The Information Brochure which follows was sent to each graduate student who received an appointment under this program. It describes the operational details of the program, especially with regard to the procedures for payment of expenses, travel and compensation. It also emphasizes the students obligations for technical reports and program evaluation. The reactions to this detailed brochure have been very positive.

SOUTHEASTERN
CENTER FOR
ELECTRICAL
ENGINEERING
EDUCATION (SCEEE)

Management Office
Central Florida Facility
11th & Massachusetts Avenue
St. Cloud, FL 32769
(305) 892-6146

Please reply to:

1984 USAF-SCEEE
GRADUATE STUDENT SUMMER RESEARCH PROGRAM

INFORMATION BROCHURE

for

GRADUATE STUDENT RESEARCHERS

April 1984

I. GRADUATE STUDENT RESEARCHER OBLIGATIONS

SCEEE is required by contract to impose certain obligations on you in your status as a Graduate Student Researcher. This section outlines those obligations, and you should read them thoroughly. You are required to sign and return the statement of understanding before the final processing of your appointment can be completed. The following is a list of these obligations:

1. RESEARCH GOALS AND OBJECTIVES: A statement of research objectives must be provided to SCEEE near the beginning of the summer research period. It should outline your goals and the approach you intend to follow in researching these goals. It should be submitted with your first invoice for payment. Neither travel expenses nor expense allowances will be reimbursed until after receipt of your statement of research objectives. The report should clearly indicate the date of your first working day of the summer research period.

2. REGISTRATION: You should be registered in your graduate school for summer 1984. This can be under a special studies category or equivalent.

3. FINAL REPORT: At the end of your summer research effort, you are required to submit to SCEEE a completed, typewritten scientific report stating the objective of the research effort, the approach taken, results, and recommendations. Information on the required format will be sent to you with a "FINAL REPORT INFORMATION BULLETIN" and sample report. However, the final report must be approved by your SFRP Supervising Faculty Member and then transmitted so as to reach SCEEE by Friday, September 28, 1984. Payment of "Compensation" for the final two weeks of your ten-week research period cannot be made until SCEEE has received and approved this report in the required format.

4. PROGRAM EVALUATION QUESTIONNAIRE: You will be asked to complete a critique form at the end of your research period regarding your impressions of the program. This critique form should be completed and returned to SCEEE by Friday, September 28, 1984 along with your final report. Return of this form is a program requirement. Final compensation will not be paid until the critique is also received at SCEEE.

5. U.S. Air Force-SCEEE Graduate Student Researcher Relationship: The U.S. Air Force and SCEEE understand and agree that the services to be delivered by the SCEEE Graduate Student Researcher under this contract will be non-personal services and the parties recognize and agree that no employer-employee or master-servant relationships will exist between the U.S. Air Force and the SCEEE Researcher. Non-personal services are defined as work performed by an individual who is responsible for an end item (such as a report), free of supervision of the U.S. Air Force and free of an employer-employee relationship.

As a SCEEE Graduate Student Researcher, you will not:

(a) Be placed in a position where you are appointed or employed by a federal officer or are under the supervision, direction, or evaluation of a federal officer, military or civilian;

(b) Be placed in a staff or policy-making position;

(c) Be placed in a position of command, supervision, administration, or control over Air Force military or civilian personnel or personnel of other contractors or become a part of the U.S. Air Force organization.

The services to be performed under the GSSR Program do not require SCEEE or the SCEEE Researcher to exercise personal judgement and discretion on behalf of the U.S. Air Force; rather, the SCEEE Researchers will act and exercise personal judgement and discretion in coordination with their SFRP Supervising Faculty Member on their research programs on the GSSR Program conducted by SCEEE.

The Air Force will have unrestricted use of and access to all data developed during the period of this appointment.

II. ALLOWABLE TRAVEL EXPENSES

The GSSR Program provides potential funding for one round trip between your home and your assigned research location. As soon as you have signed and returned your appointment letter along with the budget sheet, you will be authorized to receive reimbursement for travel expenses as described below.

As outlined in the SCEEE Graduate Student Researcher Obligations section in this brochure, you are authorized reimbursement for travel to your assigned research location at the start of your summer effort and a return trip at the end of the summer research period. You are expected to make your own arrangements for this travel; after each trip you may invoice SCEEE for reimbursement of allowable expenses in the format described in the Instructions for Invoicing for Compensation and Reimbursement section of this brochure. Closely coordinate your travel plans with your SFRP SUPERVISING FACULTY MEMBER.

All travel reimbursements under SCEEE GSSR appointments are made according to current SCEEE policy, and deviations from the approved budget are not authorized and will not be reimbursed. In light of these restrictions, you may choose either to travel by commercial airline at coach rates or less, by bus, by driving your private auto, or by a combination. Please note that funding for rental cars is not allowed; SCEEE will not reimburse this expense. With any of these choices you may claim reimbursement up to the amount for the most direct routing, taking into account the desirability of routing on interstate highways if you drive your private auto.

Reimbursement for direct route travel by commercial airline will thus be paid on your submission of an invoice to SCEEE following the invoicing instructions referenced above. In the view of the convenience of having a car at the research location, SCEEE strongly recommends that a private auto be used for travel when practical. Reimbursement for mileage when you drive your private auto is at the rate of 20¢ per mile within the routing restrictions mentioned above and will likewise be paid on submission of an invoice prepared according to the referenced instructions. These reimbursements cannot be extended to cover travel by your family if they accompany you.

During the ten week summer research period, you will be authorized to receive an expense allowance in lieu of per diem payment. The rate of this allowance is $25 per day for a maximum of 70 days. To receive this allowance, you are required to invoice for it as described in the invoicing reference above.

These items above are the only reimbursable travel allowances authorized for the GSSRP appointment. Please be advised that any additional travel expenses incurred during the appointment period will be your personal responsibility.

III. INSTRUCTIONS FOR INVOICING FOR COMPENSATION AND REIMBURSEMENT

Attached is a copy of the invoice format that you are required to use to obtain compensation or reimbursement from SCEEE. Note that all disbursements by SCEEE for compensation, travel, and/or other expenses are subject to audit approval, so you must submit receipts substantiating charges invoiced.

In addition, you must prepare and attach to each completed invoice a Brief Report of Effort.

A. PREPARATION OF BRIEF REPORT OF EFFORT

Whenever you submit an invoice for reimbursement to SCEEE you must also include a brief report describing your activities for the invoice period. To meet this obligation, you must prepare, date, sign, and attach to your completed invoice a Brief Report of Effort describing the research accomplished on the appointment and explain any travel during the invoice period.

This report should include innovative techniques and designs or discoveries which may be disclosed as patents. Rights to any inventions or discoveries shall reside with SCEEE unless determined otherwise by the contracting agency.

The brief report should never exceed one typewritten page and most often should be considerably shorter than one page.

The following is an example of such a report:

BRIEF REPORT OF EFFORT

Effort has been initiated on pole extraction methods. The modified ordinary least squares technique has been giving fair results. Work is presently being done on finding a better matrix inversion technique for the case when the coefficient matrix is ill-conditioned. Some problems have been encountered with conditioning when the data is filtered.

Travel invoice is for the trip to my research location.

May 25, 1984

B. PREPARATION OF INVOICE FORMAT

Detailed instructions on properly completing your invoice format for reimbursement are provided below. Review them carefully.

(1) In the opening statement of the claim for remuneration on the invoice format, two dates are required. They are the date of your appointment letter from SCEEE (in the first blank) and the date you signed that letter accepting your appointment (in the second blank).

Other financial items required on the invoice format are for COMPENSATION, TRAVEL, and EXPENSE ALLOWANCE. These are now explained individually with examples.

(2) COMPENSATION

(a) In the first blank to the right of COMPENSATION indicate the number of days you are claiming for compensation in this particular invoice.

(b) In the next blank enter your SCEEE Researcher daily appointment rate of $55.00 or $65.00 as noted in your appointment letter.

(c) Multiply the number of days times your appointment rate and enter the total dollar amount in the blank at the far right side. Note that the accumulated total number of days you claim on this appointment may not exceed the number authorized in your appointment letter. Some specific details on the compensation days must be provided in the next space.

(d) Under the heading Date, list the date of each of the days you are claiming for compensation, and opposite each date under the heading Place of Activity indicate where you worked on that date.

A sample entry of a correctly completed COMPENSATION item is shown below:

COMPENSATION: (10 days @ $65.00 per day)..... $ 650.00 (II)

Date (Specify exact dates)	Place of Activity
May 23-25, 1984 (inclusive)	AFAPL/POD High Power Lab
May 28-31, 1984 (inclusive)	WPAFB Computer Center
June 1,4,5, 1984 (inclusive)	AFAPL/POD High Power Lab

(3) TRAVEL

(a) Under the heading Date indicate the date you departed on your trip and the date you arrived at your destination.

(b) Under the heading Dept/Arrival Time list the departure and arrival times for the corresponding days you listed under Date.

(c) List your destination under the heading Destination.

(d) Under the heading Mode, indicate your principal means of conveyance; i.e., commercial air, private auto, etc.

(e) Under the heading Amount, itemize these expenditures for travel reimbursement.

(f) Total these travel items and enter the total dollar amount to be reimbursed for travel in this particular submission on the line to the right of Total Travel Expense.

An example of a correctly completed TRAVEL entry is shown below.

TRAVEL: (Attach receipts for all airline or bus charges. Payment cannot be made without receipts attached to invoice.)

Date	Dept/Arrival Time	Destination	Mode	Amount
5/18-5/22/84	0630/1530	Wright-Patterson AFB, Ohio	Private Auto	$480.00

One-way trip from home in Eugene, Oregon to Wright-Patterson AFB, Ohio, (2400 mi x 20¢/mi= $480.00)
(mileage at start: 24162; at end: 26562)

Total Travel Expense ..... $ 480.00(III)

Please note the following comments concerning the TRAVEL EXAMPLE:

i) Travel by your private auto in lieu of a commercial airline is authorized as a convenience to the traveler;

ii) Travel with use of privately-owned vehicle will be reimbursed at the rate of 20¢ per mile provided mileage is listed with the start and end mileage on each separate use for all distances over 100 miles.

(4) EXPENSE ALLOWANCE

This item on the invoice will be used to claim the $25 per day for reimbursement of costs incurred at your assigned research location.

(a) In the first blank to the right of EXPENSE ALLOWANCE enter the number of days for which you are claiming reimbursement of the expense allowance for costs incurred at your assigned research location.

(b) Multiply this number by the daily allowance rate of $25.00 and enter this total dollar amount in the blank at the far right.

(c) Itemize the days for which you are claiming the Expense Allowance reimbursement. It can include weekend days and holidays as well as regular work days.

The following is a sample of a correctly completed EXPENSE ALLOWANCE item.

EXPENSE ALLOWANCE: (14 days @ $25.00/day)..... $ 350.00 (IV)

Specific dates covered:
5/23/84 - 6/5/84 (inclusive)

(5) You may combine reimbursement requests for compensation, travel, and expense allowance in the same invoice. The total for all items invoiced should be indicated on the blank labeled GRAND TOTAL FOR INVOICE in the lower right hand side of line 5.

(6) IMPORTANT: Indicate in the space provided on each invoice the address to which you want the check mailed.

(7) You must sign and date your invoice in the lower right hand corner as VENDOR before it is submitted; you MUST also have your Summer Faculty Research Program (SFRP) Supervising Faculty Member countersign the invoice before it is mailed to SCEEE.

Invoices should be mailed to:

GSSR PROGRAM OFFICE
P.O. Box 68
1101 Massachusetts Avenue
St. Cloud, Florida 32769

GRADUATE STUDENT SUMMER RESEARCH
INVOICE FORMAT

(Brief Report of Effort Attached)

1. I claim remuneration from SCEEE under the terms and conditions of the agreement dated _____ and accepted _____ as follows:

2. COMPENSATION: (_____ days @ $_____ per day).....$_____ (II)

Date (Specify exact dates)	Place of Activity

3. TRAVEL: (Attach receipts for all common carrier charges. Payment cannot be made without receipts attached to invoice.)

Date	Dept/Arrival Time	Destination	Mode	Amount

Total Travel Expense..... $_____(III)

4. EXPENSE ALLOWANCE: (_____ days @ $25.00/day)..... $_____ (IV)

Specific dates covered:

5. GRAND TOTAL FOR INVOICE (Sum of II, III, IV, above)..$_____ (V)

6. Please send check to following address:

7. I certify that compensation invoice is not concurrent with compensation received from other federal government projects, grants, or employment.

X _____	X _____
SFRP SUPERVISING FACULTY SIGNATURE	VENDOR SIGNATURE
Faculty Location _____	Social Sec. No. _____
Telephone _____	Telephone _____
Date _____	Date _____

GRADUATE STUDENT QUESTIONNAIRE

The attached 3 page questionnaire was completed by the students at the end of their appointments. This was one of their specific obligations. Similar questionnaires were completed by the appropriate Air Force Laboratory contacts and by the student's supervising professors. The detailed responses from these other sources are included in the 1984 Program Management Report on the Summer Faculty Research Program.

A compilation, unedited, of the Graduate Student responses is included following the Evaluation Questionnaire. In general, these responses were very favorable. However, some troublesome situations still exist having to do with short term housing, initial start up financial arrangements and the interactions among the students, faculty, and laboratory personnel.

1984 USAF/SCEEE GRADUATE STUDENT SUMMER RESEARCH PROGRAM
EVALUATION QUESTIONNAIRE
(TO BE COMPLETED BY GRADUATE STUDENT PARTICIPANT)

Name _____

Dept. (at home) _____

Home Institution _____

Summer Supervising Professor _____

Research Colleague _____

Laboratory Address of Colleague _____

Brief Title of Research Topic _____

A. TECHNICAL ASPECTS

1. Was the offer of research assignment within your field of competency and/or interest? YES___ NO___.

2. Was the work challenging? YES___ NO___. If no, what would have made it so? _____

3. Were your relations with your supervising professor and research colleague satisfactory from a technical point of view? YES___ NO___. If no, why? _____

4. Suggestions for improvement of relationship. _____

_____

_____

5. Considering the circumstances of a summer program, were you afforded adequate facilities and support? YES___ NO___. If no, what did you need and why was it not provided? _____

_____

_____

GRADUATE STUDENT QUESTIONNAIRE (Page 2 of 3)

6. Considering the calendar "window" of ten weeks being limited by varying college and university schedules, please comment on the program length. Did you accomplish:

More than___, less than___, about what you expected___?

7. Do you feel the graduate student appointment should continue to require affiliation with a Summer Research Faculty Member? YES___NO___.

8. Were you asked to present seminars on your work and/or your basic expertise? YES___NO___.
Please list number, dates, approximate attendance, length of seminars, and title of presentations.

9. Were you asked to participate in regular meetings in your laboratory? YES___NO___. If yes, approximately how often?_____

_____

10. Other comments concerning any "extra" activities._____

_____

_____

11. On a scale of A to D, how would you rate this program?

	A (HIGH)....(LOW) D			
Technically challenging	A	B	C	D
Future research opportunity	A	B	C	D
Professional association	A	B	C	D
Enhancement of my academic qualifications	A	B	C	D
Enhancement of my research qualifications	A	B	C	D
Overall value	A	B	C	D

Please continue to next page.

GRADUATE STUDENT QUESTIONNAIRE (Page 3 of 3)

B. ADMINISTRATIVE ASPECTS

1. How did you first hear of this program?_____

_____

2. What aspect of the program was the most decisive in causing you to apply?_____

3. How do you rate the stipend level?
Generous____ Adequate____ Meager____.

4. Please give information on housing: Did you reside in VOQ____, apartment___, other (specify)_____? Name and address of apartment complex and managers name._____

_____

5. Would you encourage or discourage expansion of the student program? _____Why?_____

6. Considering the many-faceted aspects of administration of a program of this magnitude, how do you rate the overall conduct of this program? Excellent__Good__Fair__Poor__. Please add any comments.

_____

_____

7. Please comment on what, in your opinion are:
   a. Strong points of the program:_____

_____

_____

   b. Weak points of the program:_____

_____

_____

8. On balance, do you feel this has been a fruitful, worthwhile, constructive professional experience? YES__NO__.

9. Other remarks (Use reverse side if desired):_____

_____

_____

TABULATION OF STUDENT QUESTIONNAIRE RESPONSES

In this section we have tabulated the 84 student responses to the questionnaire. These are presented, mostly verbatim, with only minimal editing of format. The tabulation consists of two major divisions; those comments on the Technical Aspects of the program and those on the Administrative Aspects. There are ten categories under the Technical Aspects and nine under the Administrative Aspects.

TABULATION OF STUDENT QUESTIONNAIRE RESPONSES

A. TECHNICAL ASPECTS

1. Assignment in field of competency and/or interest? Yes: 75
   No: 03

2. Work challenging? Yes: 74
   No: 03

3. Relations with professor and colleague satisfactory? Yes: 70
   No: 08

   If no, why?

Offered no aid or supervision. Not constructive relationship. We did his work and he got paid twice as much. My supervising professor provided me with zero help when I needed it. Had little guidance from research colleague. Most of the work was done by myself since the supervisor was not familiar with the field. Not enough communication. Lack of direction. The research colleague was satisfactory, but the supervising professor did not provide help with the research. Research contact was not organization development oriented. Professor only concerned with his future.

4. Suggestions for improvement of working relationships:

More information on available research topics before the program began would have been helpful. More freedom, conduct personal interviews to hire faculty members. Research colleague should have a clear idea what work is to be done before students arrive. More interaction needed between Air Force research colleagues and graduate student researchers. If a more formal meeting format with research colleague could be arranged, it would be more satisfactory. More pre-appointment contact needed. Try to have a professor and a student from the same university work together so that no transition is needed between them. Supervising professor's function was not well defined; he seemed to only monitor (unnecessarily) my activities; he should have a more well defined job. More specific goals from research colleague would help. Removing the conflict between research colleague and his supervisor would also help. I was expected to act as a support service for my supervising professor. The role of the graduate student researcher should be made more clear. Meetings to discuss research topic. The supervising faculty member needs to be in charge and provide helpful guidance with the research. Define from beginning an achievable set of goals and suggested deadlines to meet. A greater degree of "upfront time" to allow more preparation on the part of the graduate student in conjuction with the supervising professor. The summer would have been more fruitful if my supervisor had worked on a separate project. I would have enjoyed working with other researchers here at HRL as I have worked with my supervisor for two years previous to this appointment. Better match between researcher and research colleague in area of interest and knowledge. More contact before assignment actually begins. I was not included in any of the meetings with USAF research contact.

5. Were you afforded adequate facilities? Yes: 68
No: 10

6. What was your accomplishment in ten weeks? More than expected: 14
Less than expected: 18
About what expected: 45

7. Should graduate student appointment continue to require affiliation with a faculty member? Yes: 50
No: 27

8. Were you asked to present seminars? Yes: 16
No: 61

9. Were you asked to participate in meetings? Yes: 41
No: 37

10. Other comments on extra activities:

I attended many fruitful seminars and talked with and presented my work to many of the leading theorists and experimentalists in my field. Members of our party gave seminars approximately every 2-3 weeks. We were invited to participate in the development & evaluation of General Dynamics expert system. A tour of the Armament Laboratory was interesting and should be continued. One of the best "extras" of the summer was the opportunity to meet many of the people working on LAIRTS (an infrared shuttle telescope), and see how such a program is run. Several seminars on fluids and many body theory at VDRI. The social evening was nice. We have been allowed to work largely uninterrupted. Telephone numbers were not shuffled properly, and that has been an annoyance. Spent quite a bit of my time inquiring as to what the research interests of the other investigators at the lab entailed. We were included in laboratory meetings when they were related to our research project. There was a picnic held in the middle of the summer so that the visiting faculty could meet with everyone - very nice. We are not informed about our acceptance into the program until late April which makes it difficult for us to prepare with our personal affairs and with the research topics we will work on in the summer. Notification of acceptance in the program during the end of April makes arrangements both of a research topic and of personal affairs (moving) very difficult. Especially difficult to locate reasonable - priced summer housing. Attended a couple of demonstrations by outside groups. Extra activities should be better exploited since the summers' work is to also be an educational experience. The tour of the base was very interesting. I also attended several conferences, one at RADC, two days at Minnowbrook which were very informative. We witnessed a test blast which aided us in understanding the practical applications of our research.

10. Other comments on extra activities (continued):

Visited a LECO display. I really didn't have any time for any "extra activities" since I worked many more hours than what I was contracted for. Attended 3 seminars. My work is to furnish the basis for a technical report to be published by the Leadership and Management Development Center. Participation was encouraged by professor. Working with the machine shop during fabrication procedures was enjoyable and educational. Beginning information meetings were good - generated much discussion.

11. How would you rate this program? High (A) ---------- Low (D)

Technically challenging:	A: 49 B: 27 C: 3 D: 0
Future research opportunity:	A: 55 B: 16 C: 3 D: 3
Professional association:	A: 47 B: 21 C: 9 D: 2
Enhancement of my academic qualifications:	A: 38 B: 33 C: 6 D: 0
Enhancement of my research qualifications:	A: 53 B: 21 C: 4 D: 0
Overall value:	A: 59 B: 15 C: 3 D: 0

B. ADMINISTRATIVE ASPECTS

1. How did you first hear about this program?

Through my supervising professor. Through Office of Chief Scientist, AFWL/CA, AFWL/PR, specifically: John Ungvarsky. Dr. Feld had worked on the program before. Announced by supervising professor at school. Notice posted by Dr. Reeker. Talking to a faculty member accepted in the program. Through Major/Professor, H. Donnertt. Through my major professor, Dr. Pratul Ajmera, LSU. Through appropriate research office at WPAFB. From a professor in my department. Dr. Chen-Chi Hsu, my advisor, recommended the program. Was informed of it by a Wyoming astronomy professor. My supervising professor told me about it. I was notified by the supervising faculty member. Notice on bulletin board in placement office of Ohio State University. From my summer research faculty advisor. Academic professor notification. Through another student who had previously participated in the program. From Dr. Paavo Sepri. He expressed a desire for me to apply. From my undergraduate advisor. From the supervising professor. Through a member of the staff at HRL. Dr. Owen, Ohio State University, who had previously participated. From previous researchers in my department. From my summer supervising professor. I saw a poster on the chemistry department bulletin board. I was informed of the program through a professor at Old Dominion University. I saw a notice on a bulletin board in the computer science building. My supervising professor had taken part in the program before and he told me of his work. From my faculty supervisor. From my preceptor, Dr. Stone. Through my major professor. Through my profesor at school who also applied. Poster.

1. How did you first hear about this program (continued)?

Looking at job offerings for summer. My major professors at UCF informed me of this summer support program. Through faculty at the university. My faculty advisor. Through a former SCEEE faculty member. My graduate advisor suggested it as a way to get some outside experience. Through Dr. Schlegel. Through a fellow student. From my supervising faculty member. Announcement on bulletin board. Through my major professor. Notice in the Statistics Department. Through a professor. A program flyer was posted in the Mechanical Engineering Office at Purdue. From a professor at CSU, in a newsletter about research funds. Dr. Sorensen told me about the program after he had been accepted. Through my university professor. Through Dr. Lawandy. Thru Dr. Isaac Weiss of Wright State University. From professor from State University. From my professor. Through HRL personnel. Flyer was posted in the department at school. In information I received by writing the AFOSR. Contact at Wright-Patterson. Through Professor H.C. Sorensen, SFRP. Professor Louis Chow invited me to come with him to work. Prof. L.C. Chow. Through my supervisor. Through my supervising research professor at home school. Via Dr. Kent Knaebel at Ohio State University. From supervising professor. From University of Kentucky, Electrical Engineering Department chairman. Through the faculty supervisor. Was contacted by Dr. Fowler. Professor. Thru my faculty advisor. From faculty members at school. Through Bob Vance. From Dr. G.B. Howze. From my advising professor at university. Through my advisor. Professor Patt approached me with the idea.

2. What was the main reason you applied for this program?

Chance to work in area of strong interest. Great potential research facilities available. Good pay. The chance to see what the research facilities were like and an opportunity to work at a project which would aid me in my future research. Specific area of research supervising professor wished to cover. Opportunity to use Ada. Possibility of publishing the work. More research experience. The opportunity to do research and gain experience. The opportunity to combine engineering and medical endeavors. The research topic. The opportunity to do my own research. Type of research. Possibility of continued support. Opportunity for follow-on study. The chance to meet people and work at a different place this summer. Professional association and enhancement of personal qualifications. The prospect of doing original research. The opportunity to get good work experience. Chance to earn money while continuing research previously begun. The acquisition of practical and applied experience. My participation last year and satisfaction with the program. The opportunity to do research in a non-university setting. The challenging research opportunity. The prospect of hands-on work experience in the field I plan to pursue. Opportunity to establish contacts for funding and exchanging information. Applied work and stipend. Money. Opportunity to gain experience in a research laboratory.

2. Main reason for applying (continued):

Good research opportunities at a different location. I was anxious to gain experience in research techniques. Being able to write programs for a scientific application. The chance to do research in a different environment from the university level; to visit the east coast. The need for more experience. The chance to work with people involved in aerospace medical research. Research and laboratory experience. Being able to study what interested me. The fact that I would be able to spend time researching a topic of special interest. It involved physics and lasted for summer only. The area of research and potential of experience to be obtained. Opportunity to be involved in research. Research opportunity in a non-academic environment. Research and professional association potential topics available. The opportunity of working with the government and at an Air Force base were the most decisive. The opportunity to do some hard research. The suggested area of research. Convenience; summer work with thesis opportunity. The problem posed. The work I did this summer was on a topic in which I will do my thesis. Research opportunity. Research experience. I had no information on the program other than the address. The opportunity to do research. New lab opportunity and support. The opportunity to do research at another lab. The opportunity to do research at WPAFB. The experience of working in the research of Ti alloys. The area of research. The work is related to my thesis area. Future research opportunity. Time; ten weeks in summer. Opportunity to work on defense-related topics. State of the art research, opportunity for graduate thesis topic. The financial and experience aspects. Excellent opportunity within my area of graduate study. The opportunity to be part of high quality research. Interesting work. The opportunity for the research experience. Opportunity to do research in a technically challenging atmosphere. The opportunity to sidecover and define your own research topic and to work closely with others involved in research efforts. The chance to do "self-structured" research. Work in my field of interest. Professional contacts and the opportunity to do meaningful research related to the topic in which I am currently doing my masters thesis. Research experience; lack of funding at my school. Potential for future work. An opportunity to work with my professor. Opportunity to work on thesis. It was associated with the Air Force. Major-related summer job.

3. How do you rate the stipend level?

Meager:	03
Adequate:	36
Generous:	14

4. Where did you reside?

Apartment:	25
VOQ:	08
Other:	20

5. Would you encourage or discourage expansion of student program?

Encourage: 75
Discourage: 02

6. How do you rate the program administration overall?

Excellent: 35
Good: 38
Fair: 05
Poor: 00

7A. Comments on the strong points of the program:

Experience gained in research. It encourages the advancement of science, forces publication, pays graduate students at a decent level, and provides fantastic facilities to graduate students. The ten week program fits well into student curriculum; also by working for the summer, incentive for completion of degrees is higher. Objectives and requirements clearly defined. Interaction with non-programmers in a real work environment. Stipend was generous; no complication in filling the invoice and receiving stipend. Management office was very efficient and always available for assistance. Good research facilities. Good pay. Opportunities to meet diverse peoples and research. Students able to gain laboratory experience that isn't as accessible at university. Extensive cooperation and support of associates and facilities. Inspiration from a faculty supervisor. The variety of research students can participate in. Association with respected researchers in the field. Research opportunities. Adequate support for the opportunity. Exposure to needed research, association with professionals, chance to determine types of research needed and chance to obtain support. Opportunity to research in your field of interest with support and facilities of the Air Force. I enjoyed this program because it enabled me to work on something I had never dealt with before. It will enhance greatly my future research and studies. Professional association, opportunity of meeting other scientists. It provides graduate students with practical experience. Gives student excellent work experience. Pay is good. Excellent program. Professional relationships. Development of research skills away from college using state of the art equipment. The amount of differing conditions and work situations presented many examples and possible applications of the research field of interest. Diverse research opportunities which can be excellent leads for future follow-up work. The opportunity to do interesting and useful research is one strong point. Given the procedure SCEEE has for payment, they are very prompt and efficient. Research and professional association opportunities. The opportunity for concentrated research which would be difficult with the distractions of a university environment. Getting the "academic" out of the university and into the real world.

7A. Comments on strong points (continued):

Especially helpful in expanding the students knowledge of what is really important. The strong point for me was the people I worked with. Outside experience, pressure to produce report in time frame, access to large database for future work. This program is an excellent opportunity for graduate students to find out about one type of research working environment and gain some practical experience at the same time. Good research opportunities. Good staff advisement, well organized. Helpful housing already set up. Provides an opportunity for a graduate student to work with experienced engineers and technicians on an actual problem faced by some facet of the military; provides a grand opportunity for fruitful research. It allows one to apply knowledge to "real world" applications. Opportunities provided to graduate students. It moved me towards more independent thought and study. Contractors are handling the paper work. The exposure. Good organization and in my case, excellent guidance and excellent compensation. Access to the necessary facilities we needed. We had no problem attaining the necessities for our experiment. High stipend level. Also, the fact that I worked more of a "real-world" and less academic environment was a good experience for me. For the AF, it provides an influx of people with different talents. For myself, it provided the opportunity to approach a practical problem rather than an academic one. The program provides the graduate student with the opportunity to do original research and to gain experience. Opportunity to work with others within the program as well as a rewarding experience as a researcher. Provides a situation in which university students and professors can learn about the research problems that are applicable to problems the Air Force has. Opportunity to work on and learn about state of the art techniques in your field. Flexibility of start in ten week appointment. The program provided me with an opportunity to do research with some very distinguished researchers in the government as well as provide contact with contractors from industry. Educational/learning opportunities; close work with faculty member; excellent laboratory experience. Good opportunity to become acquainted with Air Force research. Good concept. Good stipend. Independence from research sponsor. All aspects were well administered with a minimum of bureauracy. The chance to work with highly qualified and experienced people and also to work with modern equipment. Provides excellent research opportunities. Enhancement of knowledge and research experience and to give one an idea of how the government works. Good administration. Good opportunity for research. The topics for research. The opportunity for continued research under the RIP grants. Technically challenging. Mixing of people from different institutions generates new ideas and perspectives. The opportunity for students to do research in a working lab. The available research facilities. The freedom to work on a project of my choice. Opportunity to conduct experiments in a facility that no university lab could ever hope to match.

7A. Comments on strong points (continued):

As a graduate student I was able to work by myself and find research topics to work on when I become a faculty member. Matching of research interest with assignment. Opportunities to have contact with professionals who work day to day on defense related problems of academic interest. Helps to keep university research and applications research on same level; moving in same direction. Opportunity to work on state of the art research; opportunity to use excellent facilities. Initiating research and new technologies. As a student, this was a remarkable education in research techniques and theory. Financial support was excellent. Added technical support in the Air Force laboratory was good for the Air Force. Use of Air Force equipment, shop, was great for universities. Research experience, association with professionals. I feel this program is excellent. Most of the problems I experienced were due to the fact that I applied late and my supervising professor was not from my school. These problems were worked out early in the summer and presented no major setbacks. Greater academic awareness of Air Force problems and interest in attacking these problems. Ability to work in a research environment, financial help for remaining work on degree. Flexibility in choosing the research project. Research experience. Good experience, potential for future work. The area of the investigation; the summer research faculty member and the stipend. Help and support provided by the people at RADC. The quality of the working environment and the facilities was excellent. Flexibility of research topic, professional relationships, experience.

7B. Comments on weak points of the program:

Pay is adequate only because of the per diem. A 30% increase in per day rate would not be unreasonable. Often the ten weeks is not long enough to finish what was started. Computer system was not managed to best advantage. Head office located in Florida makes paycheck cashing hard. Unavoidable short length of research appointment. Students need some kind of advance to initially set up a new household. Most students do not have the money it takes to move and get settled. Unclear role of the graduate student. Method of payment-time lag could be troublesome for students with no savings to support them first few weeks. With the invoice system of payment, could not depend on when paycheck would arrive. My supervising professor and I ended up working on different topics and my topic had nothing to do with my original research proposal in my application. I think requiring someone to outline and research project he will conduct before knowing very much about what is available to work on is mostly a waste of time. The graduate student should be allowed to work on his own project, perhaps under the supervision of a laboratory staff member instead of the SFRP supervisor, if necessary. Too short. It requires affiliation with a supervising faculty member. Research period is to short. It should be 12 weeks in length. No cohesiveness among other SCEEE researchers, lack of "upfront time" from

7B. Comments on weak points (continued):

the time of notification of the graduate student to the initiation of the program, relative to the faculty. A longer time would allow more preparation on the part of the graduate student. Form of payment. I found it extremely inconvenient to receive an out of state check which banks would not immediately cash. This was also a problem last year. I would strongly recommend using money orders. Perhaps the length of the program could be more flexible. The cold start, lack of initial briefings, uncertainty about housing, etc. More hand-holding is needed at the beginning. Perhaps need a pre-summer visit for the student in order to specify what project is of interest to the lab and how the student can use his/her talents to contribute. Ten weeks is not quite adequate. Viewed as "additional duty" by colleague, ambiguity of role in organization. The pay was a little low and living allowance insufficient. Should give notice more advanced. Time limitations. Government facility. Lab space not provided, bureauracy of the system. Time limitations. However, it took too long for government approvals of the project - whether it be for the project itself or for the equipment we needed for it. I felt I had too many restrictions on me as a contractor here, however I feel this is something that really can't be improved upon. The computer terminal at the lab I worked did not function properly. It slowed my work considerably. There was no coordination on the issue of housing for the summer researchers. I received no assistance in this aspect. Not enough time to prepare. Notification of acceptance is late in the school term. Perhaps things could be shifted earlier so notification comes earlier. Nothing guarantees the interest or cooperation of people at the research facility. My particular project: too much emphasis on product development rather than research. There are many graduate schools and graduate students looking for research topics. Based on my limited experience, it appears that the Air Force has many such research topics but is doing a poor job of communicating its need. Suggestions: (1.) A once a year informal work shop at each lab at which the Air Force presents its research needs/interests and universities in the area present their areas of expertise; and (2.) A series of publications that list, by discipline, Air Force research needs. The publication would be sent to academic departments requesting it. It would be more economical if housing on base could be provided. Does not consider adequately the difficulty of relocating. The local representative was little help. A pre-summer visit for graduate students would help in finding apartments, etc. Supervisor was of absolutely no help in locating. It is silly to require us to be registered in our home institution for the summer session. Housing facilities minimal. The locations of the laboratories for interested individuals on the west coast. The short time of ten weeks for research. Procurement procedures. Too short! Ten weeks is not quite long enough for a good experimental effort. Short length of time. It took me several weeks just to understand what needed to be done. Then the rest of the time flew by. Research period was too short.

7B. Comments on weak points (continued):

Allow the student a pre-visit. This would have been very helpful in my case. It would have allowed me some time to see the system that I eventually worked on. My equipment needs could have been identified sooner. Publicity on university campus. Short time frame, 9-5 nature of working environment tended to go against academic sensibilities of researchers. Only ten weeks. When entering the tenth week, the individual wishes he had a few more. Not as much communication between staff and summer research personnel as I would like. Distance of travel limited period of work. Very few formal opportunities to become acquainted with research in other Air Force labs at the research location. I could have worked twelve weeks and gotten 25% more accomplished since I had everything built and running at the end of the term. Time is short especially if there are "snags" in the experiment not known from the start. It is limited too greatly in the number of participants allowed. In our case, the research task provided by the correspondents was poorly defined and we had little feedback from them as the summer went on. Ten weeks is not quite long enough for experimental research. Not enough independence. My supervising faculty member is not qualified for this job. Would increase pay for graduate students. At times it was difficult to use the IPS computer to carry out summer research. Work integration and coordination between people and resources. Ten weeks is really too short a time to get much accomplished.

8. Has this been a fruitful, worthwhile, constructive experience?

Yes: 77 No: 1

9. Other remarks:

Would like to see the length of the program be optional with a ten week minimum and perhaps a 15 week maximum. Program has allowed me to explore a work situation in which I could explore my feelings toward research in general as opposed to applied industrial applications. Military bases should allow more access to their facilities such as using the gymnasium. The campus apartments were totally unacceptable for living. Construction crews interfered with any kind of comfortable living. I recommend informal meetings to talk with other professionals. Appointments should be made earlier in the year. This would allow literature searches, reading and learning about the project to begin prior to the ten week appointment. This would allow more research to be conducted during the actual residence at the research location. A listing of other SCEEE researchers, nature of project and location would aid in establishing a feeling of unity among SCEEE researchers. I met several other researchers in my 9th week who only worked in the next building! Conversations with others working for same contractor was interesting and rewarding. Only major problems were lack of adequate office space and work area.

9. Other remarks (continued):

A permanent, private space to use with the supervising professor at times hampered work and discussion. A very worthwhile and productive program. A summer well spent. I would greatly enjoy another appointment to HRL perhaps next summer, but without the constraints of working with my faculty supervisor, whose work I am already familiar with. I believe it takes most of the ten weeks just to figure out the workings of the lab...a subsequent stint would be much more productive. Primarily, two aspects would enhance the program: 1. A definition of goals and resources available at the beginning of the period. 2. Recognition should be given to the Air Force personnel who are vital on these projects. This may help to eliminate their view of being a research colleague as an "extra duty". Earlier offical notification of acceptance in the program would have made it easier to arrange for housing. I had a productive, enjoyable summer and many opportunities inside the lab as well as outside, that I will probably never have again. It was challenging and pleasant to work with the permanent staff in the lab and gain some of their knowledge and expertise. The most important benefit was being able to work in an area of chemical physics which I find exciting and technically important. I felt like a member of a real team. Another weak point is the process of receiving your salary. It took a month before I received my first check. This was no fault of mine for I filed my invoice after two weeks but for some reason it took another two weeks for me to get it. By this time I had just about run out of money and I had bills such as rent, utility, etc., that were due. There has to be a better way for a graduate student, who has very few financial resources, to receive his money. I tried to obtain a loan from the credit union but was not eligible. Your present system is not effective because you do not know when you will recieve your check. Bill collectors do not accept this fact and I was faced with a situation of whether I was going to be put out of my apartment. Luckily my check came one day before I had to pay my rent. This situation really made me dissatisified with the whole program. I did not come down to Texas for this type of frustration. I have thoroughly enjoyed working at the Armament Division this summer. All personnel have been more than helpful in answering questions we had, and it has been a very pleasant environment to work in. I feel tne length of the program could be allowed to vary so that people who could stay longer would not be limited to ten weeks. I think the ten week length is the minimum period in which any productive work can be done. I thank you very much for this opportunity and great experience. This could have been a worthwhile professional experience. The program as a whole seems worthwhile. I rather enjoyed the relationship with others at RADC. I expected to be treated as a "co-op" and was pleased to find out that is not the case. Thank you very much! Report format organization specifications are arbitrary and a pain.

9. Other remarks (continued):

We are writing for a journal and to have to make copies under two different formats is a waste of time, since it means that 1/5th of our time was spent filling out reports. One thing that needs to be improved is that dealing with the location of summer housing. When I was initially accepted as a SCEEE researcher, I contacted both SCEEE representatives in Florida and people at WPAFB about what to do concerning housing. I was told "wait till you get there, and then find housing". This caused problems because one does not locate housing overnight. Housing in Rome was unobtainable, so I spent the summer at the VOQ, which is well-run but still a motel. It is not easy to live ten weeks in a motel without cooking facilities. It would have been good if RADC had arranged apartments or a house to share for the summer researchers who were interested. Also, there was no support to go to local workshops and conferences. RADC has no funding for us. SCEEE does not fund anything but travel to and from RADC. Several of us drove 200 miles or two days to go to a conference. There was little or no central administration at RADC covering us. This program has been a very worthwhile experience for me and I will recommend this program to others. Finally I wish to thank SCEEE for the opportunity to participate in the program. I should have had a better idea of what I was going to do before I arrived. If I get another chance next year I will have all the analytical work done before I get to the laboratory so that I could do more experimental work. The opportunity has proved invaluable to my education. Hope to see the program continue strongly. I think the program is a very good one and I would like to receive any available information on other programs that are available to fund summer research, particularly at my university. This program is an excellent way for the USAF to have fresh research input from intelligent, capable individuals while reciprocally giving those individuals unique opportunities for exchange of ideas, equipment use and publication. I would like to be involved with the Air Force next summer. I was required to do many tasks which were not directly related to my research project but were needed for other research being done in the lab. While this did cut down the time I was able to spend on my own project, I felt it was valuable experience. It made me feel as though I was a regular employee and gave a feel of how research is done in a working environment. Ten weeks is a short time. The research task desired by the correspondent should be explicit, clearly defined, and of small enough scope to be accomplished, or at least well under way before the time is up. Abrupt changes in the course or nature of the research during the ten weeks should be minimized as much as possible. AFWL treated us like dirt all summer long. I worked at AFWL the summer before last, so I know how good the (AFWL) can treat a person. However, we were treated so bad this last summer that you (SCEEE) can count on me being the worst PR that SCEEE has ever had. Keep this program going!!! As a summer project program, many questions arising from the investigation were not answered because of the limited time.

APPENDIX I

1. Program Statistics

2. List of 1984 Participants

3. Participant Laboratory Assignments

1984 USAF/SCEEE GRADUATE STUDENT SUMMER RESEARCH PROGRAM

Conducted by
SOUTHEASTERN CENTER FOR ELECTRICAL ENGINEERING EDUCATION, INC.

PROGRAM STATISTICS

1. Number of Air Force Installations (Laboratories/Centers): 25

2. Applications Received (First choice as follows): 112

APL	(W-PAFB)	-13	HRL/LRT	(Lowry)	- 0
AMRL	(W-PAFB)	- 7	HRL/OTR	(Williams)	- 9
AD	(Eglin)	- 7	HRL/TS	(Brooks)	- 0
AEDC	(Arnold)	- 2	LMDC	(Maxwell)	- 5
AL	(W-PAFB)	- 2	LC	(W-PAFB)	- 1
BRMC	(W-PAFB)	- 1	LMC	(Gunter)	- 0
ESC	(Tyndall)	- 2	ML	(W-PAFB)	-11
ESD	(Hanscom)	- 1	OEHL/B	(Brooks)	- 0
ESMC	(Patrick)	- 0	RPL	(Edwards)	- 1
FDL	(W-PAFB)	- 9	RADC	(Griffiss)	- 4
FJSRL	(USAFA)	- 2	SAM	(Brooks)	-20
GL	(Hanscom)	- 5	WL	(Kirtland)	-10
HRL/LRL	(W-PAFB)	0			

3. Number of Participants: 84

Number holding Masters Degree: 24
Number holding Bachelors Degree: 60

4. Average Age of Participants: 26

5. Distribution of Participants Location

APL	(W-PAFB)	- 9	HRL/LRT	(Lowry)	- 2
AMRL	(W-PAFB)	- 4	HRL/OTR	(Williams)	- 2
AD	(Eglin)	- 5	HRL/TS	(Brooks)	- 2
AEDC	(Arnold)	- 2	LMDC	(Maxwell)	- 3
AL	(W-PAFB)	- 2	LC	(W-PAFB)	- 1
BRMC	(W-PAFB)	- 1	LMC	(Gunter)	- 0
ESC	(Tyndall)	- 1	ML	(W-PAFB)	-11
ESD	(Hanscom)	- 1	OEHL/B	(Brooks)	- 0
ESMC	(Patrick)	- 0	RPL	(Edwards)	- 0
FDL	(W-PAFB)	- 6	RADC	(Griffiss)	- 4
FJSRL	(USAFA)	- 2	SAM	(Brooks)	-14
GL	(Hanscom)	- 5	WL	(Kirtland)	- 7
HRL/LRL	(W-PAFB)	- 0			

PROGRAM STATISTICS - PAGE TWO

6. Disciplines Represented: 20

Bioengineering	- 5	Human Resources	- 1
Biology	- 4	Industrial Engineering	- 1
Business	- 3	Mathematics	-10
Chemistry	- 7	Mechanical Engineering	-12
Civil Engineering	- 5	Nuclear Engineering	- 3
Computer Science	- 1	Physics	- 7
Electrical Engineering	- 7	Physiology	- 2
Engineering Science	- 5	Psychology	- 7
English	- 1	Social Work	- 1
Environmental Health	- 1	Speech	- 1

7. Number of Colleges/Universities Represented: 42

Alabama A&M University
Alabama, University of (3)
Arizona State University
Auburn University
Brown University (2)
California State University
Case Western Reserve University
Central Florida, University of
Cincinnati, University of (2)
Colorado State University
Connecticut, University of
Dayton, University of (3)
Florida, University of (4)
Georgia Institute of Technology
Illinois, University of (2)
Iowa, University of
Kansas State University (6)
Kansas, University of
Kentucky, University of (2)
Louisiana State University (2)
Lowell, University of
Meharry Medical College (3)
Michigan State University
Missouri, University of (2)
New Mexico, University of (2)
North Dakota State University (2)
Northwestern University
Ohio State University (5)
Oklahoma, University of (3)
Old Dominion University
Purdue University
Southern Illinois University
Texas Lutheran College (3)
Texas Southern University
Tulane University (2)
Vanderbilt University
Vermont, University of (4)
Washington State University (4)
Wayne State University
Wright State University (6)
Wyoming, University of
Yale University

8. Number of States/US Territories Represented: 27

Alabama	Iowa	North Dakota
Arizona	Kansas	Oklahoma
California	Kentucky	Rhode Island
Colorado	Louisiana	Tennessee
Connecticut	Massachusetts	Texas
Florida	Michigan	Vermont
Georgia	Missouri	Virginia
Illinois	New Mexico	Washington
Indiana	North Carolina	Wyoming

LIST OF 1984 GRADUATE STUDENT PARTICIPANTS

NAME/ADDRESS	DEGREE, SPECIALTY, LABORATORY ASSIGNED
Anton Ahrens University of Kansas Department of Chemistry Lawrence, KS 66045 (913) 864-4220	Degree: B.S., Chemical Engineering, 1980 Specialty: Gas Phase Reaction Dynamics Assigned: Geophysics Laboratory
Jay Ambrose Washington State University Mechanical Engineering Department Pullman, WA 99164-2920 (509) 335-8654	Degree: B.S., Mechanical Engineering, 1984 Specialty: Thermal Sciences Assigned: Aero Propulsion Laboratory
Vicki Atkins University of Kentucky Dept. of Electrical Engineering Lexington, KY 40506 (606) 257-1104	Degree: M.S., Mathematics, 1981 Specialty: Controls Assigned: Flight Dynamics Laboratory
Joseph Badalamenti University of Dayton Mechanical Engineering Dept. Dayton, OH 45409 (513) 229-0123	Degree: B.S., Mechanical Engineering, 1983 Specialty: Mechanical Design Assigned: Flight Dynamics Laboratory
David Bauer California State University Computer Science Department Chico, CA 95925 (916) 895-6442	Degree: B.S., Applied Physics, 1982 Specialty: Artificial Intelligence Assigned: Rome Air Development Center
Robert Bigelis Washington State University Civil & Environmental Eng. Dept. Pullman, WA 99164 (509) 335-2576	Degree: B.S., Civil Engineering, 1984 Specialty: Structures Assigned: Weapons Laboratory
Scott Bischoff Texas Lutheran College Department of Biology Seguin, TX 78155 (512) 379-5675	Degree: B.S., Biology, 1984 Specialty: Medicine Assigned: USAF School of Aerospace Medicine
Pnilip Blosser Wright State University School of Engineering Dayton, OH 45435 (513) 873-2403	Degree: B.S., Material Science & Eng., 1984 Specialty: Metals Processing Assigned: Materials Laboratory

LIST OF 1984 GRADUATE STUDENT PARTICIPANTS (continued)

NAME/ADDRESS	DEGREE, SPECIALTY, LABORATORY ASSIGNED
Donna Brandelik Wrignt State University Chemistry Department Dayton, OH 45435 (513) 873-2855	Degree: B.S., Chemistry, 1983 Specialty: Polymer Chemistry Assigned: Materials Laboratory
Frederick Breslin University of New Mexico Department of Mathematics Albuquerque, NM 87131 (505) 277-4613	Degree: M.A., Mathematics, 1983 Specialty: Statistics Assigned: Weapons Laboratory
Jan Brooks The University of Alabama Dept. of Management & Marketing University, AL 35486 (205) 348-6090	Degree: M.S., School of Social Work, 1974 Specialty: Organizational Behavior Assigned: Leadership & Mgmt. Dev. Ctr.
Howard Brown The Ohio State University Department of Civil Engineering Columbus, OH 43210 (614) 422-2771	Degree: M.S., Structural Eng., 1979 Specialty: Delamination & Failure of Angle Ply Laminated Comp. Assigned: Materials Laboratory
Robert Cheney University of Missouri Physics Department Rolla, MO 65401 (314) 341-4702	Degree: B.S., Physics, 1983 Specialty: Undecided Assigned: Aero Propulsion Laboratory
Susan Cheney The Ohio State University Department of Civil Engineering Columbus, OH 43210 (614) 422-2771	Degree: B.S., Civil Engineering, 1983 Specialty: Mechanics of Structural Composites Assigned: Materials Laboratory
Michael Coovert The Ohio State University Department of Psychology Columbus, OH 43210 (614) 422-8175	Degree: M.S., Psychology, 1981 Specialty: Ind./Organ. Psychology Assigned: Human Resources Laboratory
William Czelen Wright State University School of Medicine Dayton, OH 45401 (513) 278-9185	Degree: M.D., Aerospace Medicine, 1971 Specialty: Aerospace Medicine Assigned: USAF School of Aerospace Medicine

LIST OF 1984 GRADUATE STUDENT PARTICIPANTS (continued):

NAME/ADDRESS	DEGREE, SPECIALTY, LABORATORY ASSIGNED
Jennifer Davidson University of Florida Department of Mathematics Gainesville, FL 32611 (904) 392-0281	Degree: B.A., Physics, 1979 Specialty: Applied Mathematics Assigned: Armament Division
Timothy Downes North Dakota State University Dept. of Mathematical Sciences West Fargo, ND 58078 (701) 282-8519	Degree: M.B.A., Finance Marketing, 1978 Specialty: Computer Assigned: Science/Operations Research Logistics Command
Jon Ebert University of Oklahoma Aerospace, Mech., & Nuclear Eng. Norman, OK 73019 (405) 325-5011	Degree: M.S., Mechanical Eng., 1984 Specialty: Computational Fluid Dynam. Assigned: Aero Propulsion Laboratory
James Farmer University of Vermont Mechanical Engineering Dept. Burlington, VT 05405 (802) 656-3800	Degree: B.S., Mechanical Eng., 1983 Specialty: Thermal Sciences Assigned: Materials Laboratory
Mark Ferrel Kansas State University Nuclear Engineering Department Manhattan, KS 66502 (913) 776-1393	Degree: B.S., Physics, 1983 Specialty: Nuclear Engineering Assigned: F.J. Seiler Research Lab.
John Flach The Ohio State University Psychology Department Columbus, OH 43210 (614) 422-4131	Degree: M.A., Psychology, 1978 Specialty: Human Performance Theory Assigned: Aerospace Medical Rsch. Lab.
Paul Gader University of Florida Department of Mathematics Gainesville, FL 32611 (904) 392-0281	Degree: M.S., Mathematics, 1983 Specialty: Applied Mathematics Assigned: Armament Division
Carolyn Green Wayne State University School of Medicine Detroit, MI 48202 (313) 577-5115	Degree: B.A., Biochem. & Biology, 1982 Specialty: Medicine, Physiology Assigned: USAF School of Aerospace Medicine

LIST OF 1984 GRADUATE STUDENT PARTICIPANTS (continued)

NAME/ADDRESS	DEGREE, SPECIALTY, LABORATORY ASSIGNED
Bruce Harmon University of Cincinnati Department of Economics Cincinnati, OH 45263 (513) 475-4241	Degree: B.S., Economics, 1980 Specialty: Economics Assigned: Business Rsch. Mgmt. Center
Thomas Hayward University of Wyoming Dept. of Physics & Astronomy Laramie, WY 82071 (307) 766-6150	Degree: B.S., Physics & Astronomy, 1983 Specialty: Infrared Astronomy Assigned: Geophysics Laboratory
Ron Hightower Kansas State University Dept. of Electrical Engineering Manhattan, KS 66506 (913) 532-5600	Degree: B.S., Electrical Eng., 1983 Specialty: Electrical Engineering Assigned: Weapons Laboratory
Joseph Hjelm Wright State University School of Engineering Dayton, OH 45435 (513) 873-2403	Degree: B.S., Materials Sci. & Eng., 1984 Specialty: Metal Processing Assigned: Materials Laboratory
Arthur Hogan University of Alabama Dept. of Biomath. & Biostatistics Birmingham, AL 35294 (205) 934-4905	Degree: M.S., Biology, 1979 Specialty: Applied Stat. & Mathematics, Assigned: USAF School of Aerospace Medicine
Thomas Hopp Northwestern University Dept. of Mech. & Nuclear Eng. Evanston, IL 60201 (312) 492-7470	Degree: B.S., Mechanical Eng., 1982 Specialty: Control Systems Engineering Assigned: Flight Dynamics Laboratory
Robert Hoskin Purdue University Mechanical Engineering Department W. Lafayette, IN 47906 (317) 743-6558	Degree: B.S., Mechanical Eng., 1983 Specialty: Control Systems Assigned: Aero Propulsion Laboratory
George Howard, Jr. Meharry Medical College Div. of Biomedical Sciences Nashville, TN 37208 (615) 327-6212	Degree: B.A., Zoology, 1977 Specialty: Biochemical Toxicology Assigned: USAF School of Aerospace Medicine

LIST OF 1984 GRADUATE STUDENT PARTICIPANTS (continued)

NAME/ADDRESS	DEGREE, SPECIALTY, LABORATORY ASSIGNED
Marc Hunter Southern Illinois University Psychology Department Edwardsville, IL 62025 (618) 656-5692	Degree: B.S., Psychology, 1982 Specialty: Experimental Psychology Assigned: Human Resources Laboratory
Joseph Kager Auburn University Management Department Opelika, AL 36801 (205) 749-7909	Degree: B.S., Ind./Organ. Psych., 1983 Specialty: Human Resource Management Assigned: Leadership and Management Development Center
John Kayser The Ohio State University Dept. of Chemical Engineering Columbus, OH 43210 (614) 422-6446	Degree: B.S., Chemical Engineering, 1982 Specialty: Pressure Swing Adsorption Assigned: USAF School of Aerospace Medicine
Nancy Kirkwood Colorado State University Department of Mathematics Fort Collins, CO 80523 (303) 491-7617	Degree: B.S., Computer Science, 1983 Specialty: Applied Discrete Math. Assigned: Rome Air Dev. Center
Guy Klose University of Vermont Dept. of Comp. Sci. & Elec. Eng. Burlington, VT 05401 (802) 658-4250	Degree: B.S., Electrical Eng., 1983 Specialty: Digital Signal Processing Assigned: Rome Air Development Center
John Kreuter Tulane University Computer Science Department New Orleans, LA 70118 (504) 865-5000	Degree: B.S., Mathematics, 1972 Specialty: Computer Science Assigned: Human Resources Laboratory
Michael Lange University of New Mexico Physics & Astronomy Dept. Albuquerque, NM 87131 (505) 277-2916	Degree: M.A., Mechanical Eng., 1981 Specialty: Laser Physics Assigned: Weapons Laboratory
Barry Lemieux University of Lowell Computer Science Dept. Lowell, MA 01854 (617) 452-5000	Degree: B.S., Electrical Eng., 1984 Specialty: Computer Science Assigned: Geophysics Laboratory

LIST OF 1984 GRADUATE STUDENT PARTICIPANTS (continued)

NAME/ADDRESS	DEGREE, SPECIALTY, LABORATORY ASSIGNED
Eric Liverance Yale University Department of Mathematics New Haven, CT 06520 (203) 436-1642	Degree: B.A., Mathematics, 1983 Specialty: Galois & Number Theory Assigned: Flight Dynamics Laboratory
Steven Lottes University of Illinois Department of Mechanical Eng. Naperville, IL 60540 (312) 420-7610	Degree: M.S., Computer Science, 1973 Specialty: Combustion Modeling Assigned: Aero Propulsion Laboratory
James Lyne Vanderbilt University School of Medicine Nashville, TN 37203 (615) 322-6109	Degree: M.S., Engineering Physics, 1982 Specialty: Medicine Assigned: Arnold Engineering Development Center
Duncan MacFarlane Brown University Electrical Engineering Dept. Providence, RI 02912 (401) 273-4857	Degree: B.S., Electrical Eng., 1984 Specialty: Quantum Electronics Assigned: Geophysics Laboratory
John McKelvey Wright State University School of Engineering Dayton, OH 45435 (513) 873-2403	Degree: B.S., Materials Sci. & Eng., 1984 Specialty: Metal Processing Assigned: Materials Laboratory
Steven Miller Washington State University Dept. of Civil & Eviron. Eng. Pullman, WA 99164 (509) 335-2576	Degree: B.S., Civil Engineering, 1984 Specialty: Structures Assigned: Weapons Laboratory
Margarita Miro-Julia University of Cincinnati Physics Department Cincinnati, OH 45221 (513) 475-6912	Degree: M.S., Physics, 1984 Specialty: Many Body Theory Assigned: Aero Propulsion Laboratory
Paul Nichols The University of Iowa College of Education Iowa City, IA 52242 (319) 353-6703	Degree; B.S., Psychology, 1983 Specialty: Information Theories of Learning Assigned: Human Resources Laboratory

LIST OF 1984 GRADUATE STUDENT PARTICIPANTS (continued)

NAME/ADDRESS	DEGREE, SPECIALTY, LABORATORY ASSIGNED
Edouard Noisin Meharry Medical College Department of Biochemistry Nashville, TN 37208 (615) 327-6216	Degree: B.S., Biology, 1979 Specialty: Neuronal Cell Membrane Receptors Assigned: USAF School of Aerospace Medicine
David Norton Louisiana State University Dept. of Elec. & Computer Eng. Baton Rouge, LA 70816 (504) 293-1540	Degree: B.S., Electrical Engineer, 1984 Specialty: Integrated Circuit Fabrication & Design Assigned: Avionics Laboratory
Raymond Patin Louisiana State University Mechanical Engineering Dept. Baton Rouge, LA 70803 (504) 388-5792	Degree: B.S., Mechnical Engineering, 1983 Specialty: Thermal Science Assigned: Armament Division
David Patterson University of Oklahoma School of Industrial Engineering Norman, OK 73019 (405) 325-3721	Degree: B.A., Psychology, 1981 Specialty: Human Factors Assigned: Aerospace Medical Research Laboratory
Michael Patterson Georgia Institute of Technology School of Psychology Atlanta, GA 30332 (404) 894-2680	Degree: M.S., Psychology, 1983 Specialty: Engineering Psychology Assigned: Arnold Eng. Dev. Center
Jon Phillips Washington State University Mechanical Engineering Dept. Pullman, WA 99163 (509) 335-3000	Degree: B.S., Mechanical Eng., 1984 Specialty: Thermal Sciences Assigned: Aero Propulsion Laboratory
Debra Picklesimer Wright State University Department of Chemistry Dayton, OH 45435 (513) 873-2855	Degree: B.S., Chemistry, 1981 Specialty: Organic/Polymer Chemistry Assigned: Materials Laboratory
Benjamin Pruitt University of Kentucky Electrical Engineering Dept. Lexington, KY 40506 (606) 257-8042	Degree: B.S., Electrical Eng., 1982 Specialty: Electro Physics Assigned: Rome Air Development Center

LIST OF 1984 GRADUATE STUDENT PARTICIPANTS (continued)

NAME/ADDRESS	DEGREE, SPECIALTY, LABORATORY ASSIGNED
William Rabinovich Brown University Department of Physics Providence of RI 02912 (401) 863-3078	Degree: B.S., Physics, 1982 Specialty: Quantum Optics Assigned: Geophysics Laboratory
John Ramsey The Ohio State University Aero. & Astro. Engineering Dept. Columbus, OH 43210 (614) 422-2691	Degree: B.S., Aeronautical & Astronautical Eng., 1982 Specialty: Structures Assigned: Aero Propulsion Laboratory
Christopher Reed University of Florida Dept. of Engineering Sciences Gainesville, FL 32211 (904) 392-0961	Degree: M.S., Engineering Science, 1984 Specialty: Aerodynamics Assigned: Armament Division
Joseph Rencis Case Western Reserve University Civil Engineering Department Cleveland, OH 44106 (216) 368-2952	Degree: B.S., Applied Mathematics, 1983 Specialty: Fluid Mechanics Assigned: Armament Division
Lila Roberts Old Dominion University Department of Mathematics Norfolk, VA 23508 (804) 440-3882	Degree: B.S., Mathematics, 1977 Specialty: Numerical Analysis Assigned: Avionics Laboratory
Karlin Roth University of Florida Department of Eng. Science Gainesville, FL 32611 (904) 392-0961	Degree: B.S., Applied Mathematics, 1983 Specialty: Fluid Mechanics Assigned: Armament Division
Debra Rotto Texas Lutheran College Department of Biology Seguin, TX 78155 (512) 379-4161	Degree: B.S., Biology, 1983 Specialty: Cardiovascular Physiology Assigned: USAF School of Aerospace Medicine
Diane Rotto Texas Lutheran College Department of Biology Seguin, TX 78155 (512) 379-4161	Degree: B.S., Biology, 1983 Specialty: Cardiovascular Physiology Assigned: USAF School of Aerospace Medicine

LIST OF 1984 GRADUATE STUDENT PARTICIPANTS (continued)

NAME/ADDRESS	DEGREE, SPECIALTY, LABORATORY ASSIGNED
Christine Ruben Texas Southern University Biology Department Houston, TX 77061 (713) 527-7005	Degree: B.S., Biology, 1980 Specialty: Undecided Assigned: Aerospace Medical Research Laboratory
Carlos Sanchez-Castro Michigan State University Physics Department East Lansing, MI 48825 (517) 355-3877	Degree: M.S., Physics, 1983 Specialty: Solid & Nuclear Physics Assigned: Flight Dynamics Laboratory
Randall Schadt University of Missouri Physics Department Rolla, MO 65401 (314) 341-4780	Degree: B.S., Physics, 1982 Specialty: Solid State Physics Assigned: Aero Propulsion Laboratory
Joshua Smith University of Vermont Mechanical Eng. Department Burlington, VT 05405 (802) 656-3800	Degree: B.S., Mechanical Eng., 1983 Specialty: Materials Processing Assigned: Materials Laboratory
Joseph Solomon University of Connecticut Department of Psychology Storrs, CT 06268 (203) 486-2337	Degree: M.A., Psychology, 1980 Specialty: Visual Perception Assigned: Aerospace Medical Research Laboratory
Lori Streit Arizona State University Department of Chemistry Tempe, AZ 85287 (602) 965-3461	Degree: B.S., Chemistry, 1983 Specialty: Analytical Chemistry Assigned: USAF School of Aerospace Medicine
Russell Thomas Kansas State University Department of Electrical Eng. Manhattan, KS 66502 (913) 539-3700	Degree: B.S., Electrical Eng., 1983 Specialty: Network Modeling & Analysis Assigned: Weapons Laboratory
Terry Thompson Meharry Medical College Department of Pharmacology Nashville, TN 37208 (615) 327-6979	Degree: B.S., Chemistry/Biology, 1979 Specialty: Neurotransmitter Regulation Assigned: USAF School of Aerospace Medicine

LIST OF 1984 GRADUATE STUDENT PARTICIPANTS (continued)

NAME/ADDRESS	DEGREE, SPECIALTY, LABORATORY ASSIGNED
Eric Utt University of Central Florida Dept. of Biological Sciences Orlando, FL 32816 (305) 275-2141	Degree: B.S., Microbiology, 1984 Specialty: Microbiology/Biotechnology Assigned: USAF School of Aerospace Medicine
Donald Varvel North Dakota State University Div. of Mathematical Sciences Fargo, ND 58105 (701) 777-3460	Degree: B.S., Computer Science, 1978 Specialty: Database Systems Assigned: Electronics Systems Div.
Peggy Vaughn Alabama A&M University Deptartment of Psychology Normal, AL 35762 (205) 859-7336	Degree: B.S., Psychology, 1982 Specialty: Clinical Psychology Assigned: Leadership & Management Development Center
Kevin Verfaille University of Vermont Department of Electrical Eng. Burlington, VT 05405 (802) 656-3330	Degree: B.S., Electrical Eng., 1981 Specialty: Signal Processing Assigned: Rome Air Development Ctr.
Michael Wager University of Dayton Engineering Department Dayton, OH 45469 (513) 229-2311	Degree: B.S., Physics, 1983 Specialty: Electro-Optics Assigned: Materials Laboratory
Ronald Wasserstein Kansas State University Department of Statistics Manhattan, KS 66502 (913) 532-6883	Degree: M.S., Statistics, 1983 Specialty: Regression Analysis Assigned: USAF School of Aerospace Medicine
Kenneth Wauchope Tulane University Department of Computer Science New Orleans, LA 70118 (504) 865-5100	Degree: B.A., Speech, 1971 Specialty: Artifical Intelligence Assigned: Human Resources Laboratory
Dennis Weatherby University of Dayton Chemical Engineering Department Dayton, OH 45469 (513) 229-2627	Degree: B.S., Chemistry, 1982 Specialty: Polymer Science Assigned: Materials Laboratory

LIST OF 1984 GRADUATE STUDENT PARTICIPANTS (continued)

NAME/ADDRESS	DEGREE, SPECIALTY, LABORATORY ASSIGNED
Paul Wetzel University of Illinois Department of Bioengineering Chicago, IL 60680 (312) 787-9346	Degree: M.S., Bioengineering, 1979 Specialty: Oculomotor Control Assigned: Human Resources Laboratory
Kevin White University of Oklahoma Mechanical Engineering Dept. Norman, OK 73069 (405) 325-5011	Degree: B.S.,Mechanical Eng., 1979 Specialty: Solid Mechanics Assigned: Materials Laboratory
Kurt Ziegler Kansas State University Department of Electrical Eng. Manhattan, KS 66502 (913) 532-5600	Degree: B.S., Electrical Eng., 1984 Specialty: Computer Science Assigned: Weapons Laboratory
Kevin Zook Kansas State University Department of Nuclear Engineering Manhattan, KS 66502 (913) 776-0438	Degree: B.S., Nuclear Engineering, 1984 Specialty: Laser Research Assigned: F.J. Seiler Research Laboratory

PARTICIPANT LABORATORY ASSIGNMENT

1984 USAF/SCEEE GRADUATE STUDENT SUMMER RESEARCH PROGRAM

AEROPROPULSION LABORATORY		
(Wright-Patterson Air Force Base)		
1.	Jay Ambrose	Washington State University
2.	Robert Cheney	University of Missouri
3.	Jon Ebert	University of Oklahoma
4.	Robert Hoskin	Purdue University
5.	Stephen Lottes	University of Illinois
6.	Margarita Miro-Julia	University of Cincinnati
7.	Jon Philips	Washington State University
8.	Jon Ramsey	Ohio State University
9.	Randall Schadt	University of Missouri
AEROSPACE MEDICAL RESEARCH LABORATORY		
(Wright-Patterson Air Force Base)		
1.	John Flach	Ohio State University
2.	David Patterson	University of Oklahoma
3.	Christine Ruben	Texas Southern University
4.	Joseph Solomon	University of Connecticut
ARNOLD ENGINEERING DEVELOPMENT CENTER		
(Arnold Air Force Station)		
1.	James Lyne	Vanderbilt University
2.	Michael Patterson	Georgia Institute of Technology
ARMAMENT DIVISION		
(Eglin Air Force Base)		
1.	Jennifer Davidson	University of Florida
2.	Paul Gader	University of Florida
3.	Raymond Patin	Louisiana State University
4.	Christopher Reed	University of Florida
5.	Karlin Roth	University of Florida
AVIONICS LABORATORY		
(Wright-Patterson Air Force Base)		
1.	David Norton	Louisiana State University
2.	Lila Roberts	Old Dominion University
BUSINESS RESEARCH MANAGEMENT CENTER		
(Wright Patterson Air Force Base)		
1.	Bruce Harmon	University of Cincinnati
ELECTRONICS SYSTEMS DIVISION		
(Hanscom Air Force Base)		
1.	Donald Varvell	North Dakota State University
ENGINEERING AND SERVICES CENTER		
(Tyndall Air Force Base)		
1.	Susan Cheney	Ohio State University

PARTICIPANT LABORATORY ASSIGNMENT (continued)

FLIGHT DYNAMICS LABORATORY
(Wright-Patterson Air Force Base)

1.	Vicki Atkins	University of Kentucky
2.	Joseph Badalamenti	University of Dayton
3.	Thomas Hopp	Northwestern University
4.	Eric Liverance	Yale University
5.	Joseph Rencis	Case Western Reserve Univ.
6.	Carlos Sanchez-Castro	Michigan State University

FRANK J. SEILER RESEARCH LABORATORY
(United States Air Force Academy)

1.	Mark Ferrel	Kansas State University
2.	Kevin Zook	Kansas State University

GEOPHYSICS LABORATORY
(Hanscom Air Force Base)

1.	Anton Ahrens	University of Kansas
2.	Thomas Hayward	University of Wyoming
3.	Barry Lemieux	University of Lowell
4.	Duncan MacFarlane	Brown University
5.	William Rabinovich	Brown University

HUMAN RESOURCES LABORATORY
(Brooks Air Force Base)

1.	Michael Coovert	Ohio State University
2.	Paul Nichols	University of Iowa

HUMAN RESOURCES LABORATORY
(Lowry Air Force Base)

1.	John Kreuter	Tulane University
2.	Kenneth Wauchope	Tulane University

HUMAN RESOURCES LABORATORY
(Williams Air Force Base)

1.	Marc Hunter	Southern Illinois University
2.	Paul Wetzel	University of Illinois

LEADERSHIP & MANAGEMENT DEVELOPMENT CENTER
(Maxwell Air Force Base)

1.	Jan Brooks	University of Alabama
2.	Joseph Kager	Auburn University
3.	Peggy Vaughn	Alabama A&M University

LOGISTICS COMMAND
(Wright-Patterson Air Force Base)

1.	Timothy Downes	North Dakota State University

MATERIALS LABORATORY
(Wright-Patterson Air Force Base)

1.	Philip Blosser	Wright State University
2.	Donna Brandelik	Wright State University
3.	Howard Brown	Ohio State University
4.	James Farmer	University of Vermont
5.	Joseph Hjelm	Wright State University
6.	John McKelvey	Wright State University
7.	Debra Picklesimer	Wright State University
8.	Joshua Smith	University of Vermont
9.	Michael Wager	University of Dayton
10.	Dennis Weatherby	University of Dayton
11.	Kevin White	University of Oklahoma

ROME AIR DEVELOPMENT CENTER
(Griffiss Air Force Base)

1.	David Bauer	California State University
2.	Kevin Verfaille	University of Vermont
3.	Nancy Kirkwood	Colorado State University
4.	Guy Klose	University of Vermont
5.	Benjamin Pruitt	University of Kentucky

USAF SCHOOL OF AEROSPACE MEDICINE
(Brooks Air Force Base)

1.	Scott Bischoff	Texas Lutheran College
2.	William Czelen	Wright State University
3.	Carolyn Green	Wayne State University
4.	Arthur Hogan	University of Alabama
5.	George Howard	Meharry Medical College
6.	John Kayser	Ohio State University
7.	Edouard Noisin	Meharry Medical College
8.	Debra Rotto	Texas Lutheran College
9.	Diane Rotto	Texas Lutheran College
10.	Lori Streit	Arizona State University
11.	Terry Thompson	Meharry Medical College
12.	Eric Utt	University of Central Florida
13.	Ronald Wasserstein	Kansas State University

WEAPONS LABORATORY
(Kirtland Air Force Base)

1.	Robert Bigelis	Washington State University
2.	Frederick Breslin	University of New Mexico
3.	Ron Hightower	Kansas State University
4.	Michael Lange	University of New Mexico
5.	Steven Miller	Washington State University
6.	Russell Thomas	Kansas State University
7.	Kurt Ziegler	Kansas State University

APPENDIX II

1. Listing of Research Reports Submitted in the 1984 Graduate Student Summer Research Program

2. Abstracts of the 1984 Graduate Student's Research Reports

1. Listing of Research Reports Submitted in the 1984 Graduate Student Summer Research Program

RESEARCH REPORTS

1984 GRADUATE STUDENT SUMMER RESEARCH PROGRAM

Technical Report Number	Title	Graduate Researcher
Volume I		
1	Effects of Temperature and Reactant Solvation Upon the Rates of Gas-phase Ion-Molecule Reactions	Anton F. Ahrens
2	Boiling Heat Transfer in Heat Pipe Evaporator	Jay Ambrose
3	Development of a Method for Constructing the Observer Matrix for Large Order Systems	Vicki Atkins
4	Improvements in Tire/Soil Modeling Techniques	Joseph Badalamenti
5	Computer Implementation of Nonparameteric Radar Detectors	David C. Bauer
6	Research into the Development of a Structure-Media Interaction for Dynamic Finite Element Analysis	Robert L. Bigelis
7	Phospholipid Metabolism in a Synaptic Membrane Preparation Isolated from Cerebellar Cortex	Scott B. Bischoff
8	Aging Behavior of Rapidly Solidified Ti-Co and Ti-Cr-Al Alloys	Philip E. Blosser
9	New Phenoxy Substituted Dianhydrides	Donna Brandelik
10	Stochastic Behavior of Random Lay Cables	Frederick C. Breslin
11	The USAF Organizational Assessment Package: Four Critical Decisions	Jan Leeman Brooks
12	The Uniqueness of Phase Retrieval from Intensity Measurements	Howard W. Brown

Technical Report Number	Title	Graduate Researcher
13	Infrared Measurements of Disilane Production From a A.D.C. Discharge in Silane	Robert F. Cheney
14	Finite Element Modeling of a Wall Under Blast Loads	Susan M. Cheney
15	Analysis of the J-79, J-57, and TF-33 Job Analysis Questionnaire Assessing Task Difficulty	Michael D. Coovert
16	The Physiologic Characterization, Prediction, and Biofeedback Treatment of Motion Sickness	William E. Czelen
17	An Algorithm for Segmenting Flir Imagery Containing Bridges	Jennifer Davidson
18	Computer-Based Optimization Algorithm for LOGAIR Cargo Allocation	Timothy R. Downes
19	Calculation of Enhanced Heating in Turbulent Boundary Layers Influenced by Free Stream Turbulence	Jon L. Ebert
20	Multiple Turbine Disk Simulation Using Alpid	James R. Farmer
21	The Effects of Nuclear Radiation on the Optical Characteristics of (SiO_2-ZrO_2 on Si Substrate) Mirrors	Mark A. Ferrel
22	The Effects of Psychophysical Matching on the Transfer of Training Between Alternative Motion Simulators	John M. Flach
23	An Algorithm for Segmenting Flir Imagery Containing Bridges	Paul Gader

Technical Report Number	Title	Graduate Researcher
24	Neurotransmitter Systems in the Cerebellar Glomerulus: Analysis of Gaba Uptake, Exchange, and Release	Carolyn L. Green
25	A Dynamic Approach to Airframe Cost Estimation	Bruce Harmon
26	A Readout Electronics Design for an Infrared Array	Thomas L. Hayward
27	The Factor Analysis Methodology Applied to Moe Categorization and Evaluation	Ron R. Hightower
28	The "Processing Window" for the Near Beta Ti-10V-2Fe-3A1 Alloy	Joseph M. Hjelm
29	Vehicle and Crew Scheduling in Airlift Operations	Arthur M.B. Hogan
30	A Design for Minimum Eigenvalue Sensitivity Subject to Selected Modal Insensitivity	Thomas Hopp
31	Digital LQR Design for Advanced Tactical Aircraft-Stol Approach	Robert F. Hoskin
32	The Role of Antioxidant Nutrients in Preventing Hyperbaric Oxygen Damage to the Retina	George Howard, Jr.
33	The Distributional Analysis of Contrast Sensitivity Measures	Marc W. Hunter
34	Individual and Group Dynamics: A Consideration of Climate, Task Design, and Combat Readiness Factors of the OAP/OAS	Joseph F. Kager
35	Experimental Analysis of Pressure Swing Adsorption	John C. Kayser

Technical Report Number	Title	Graduate Researcher
36	Tackling The I/O Bottleneck	Nancy K. Kirkwood
37	A Range Update Algorithm for the Data Handling/Recording System	Guy F. Klose
38	Pattern Matching Algorithms in ADA	John Kreuter
39	Optical Thin Film Coating Damage Via Pulsed Lasers	Michael R. Lange
40	Reprocessing of Barnes Transmissometer Data	Barry R. Lemieux
41	A Computer Search for M_{11} as a Galois Group Over Q	Eric E. Liverance
Volume II		
42	Dynamic Flow Structures in a Bluff-Body Combustor	Steven A. Lottes
43	Thermal Mapping Data Reduction in Non-Semi-Infinite Solid Regions of Wind Tunnel Models	James E. Lyne
44	Optical Bistability with Liquid Media: Experimental Studies and Theoretical Predictions	Duncan L. MacFarlane
45	The "Processing Window" for the Near Beta Ti-10V-2Fe-3Al Alloy	John K. McKelvey
46	Incorporating the Matrix Difference Equation Theory into the Samson2 Dynamic Finite Element Computer Code	Steven S. Miller
47	Calculation of Correlation Function and Self-Energy Contribution for Non-Diagonal Response Functions	Margarita Miro-Julia
48	Individual Differences in Spatial Ability: The Roles of Practice and Synthesis	Paul D. Nichols

Technical Report Number	Title	Graduate Researcher
49	Acetylcholine as a Neurotransmitter in Purified Bovine Glomerulus Particles	Edouard L. Noisin
50	Semi-Insulating GaAs Chromium-Doped Buffer Layers	David P. Norton
51	An Elementary Model of the Interior Ballistics of a Two-Stage Light Gas Gun	Raymond M. Patin
52	Evaluation of Training Performance for the USAF Criterion Task Set (CTS)	David W. Patterson
53	The Function of Human Operators in the Control Facilities of Wind Tunnel 4T	Michael Patterson
54	The Effective Conductivity of Layered Cloth Heat Pipe Wicks	Jon R. Phillips
55	Synthesis of Acetylene Terminated (ATS) Candidates	Debra K. Picklesimer
56	Dye Laser System Development and Beam Data Acquisition Methods	Benjamin Pruitt
57	Optical Bistability with Liquid Media: Experimental Studies and Theoretical Predictions:	William S. Rabinovich
58	Normal Modes Analysis of a 12-Bladed Disk Using the Substructuring Technique of Nastran	John K. Ramsey
59	Application of the Thin Layer Navier Stokes Code	Christopher W. Reed
60	Three Dimensional Finite Element Acoustic Analysis	Joseph J. Rencis
61	An Optimal Trajectory Problem	Lila F. Roberts

Technical Report Number	Title	Graduate Researcher
62	An Evaluation of a Parabolized Navier-Stokes Code for Three-Dimensional Flared Geometries	Karlin R. Roth
63	Cardiovascular Responses of High- and Low-Fit Men to Head-Down Rest Followed by Orthostasis and Exercise	Debra K. Rotto
64	Cardiovascular Responses of High- and Low-Fit Men to Head-Down Rest Followed by Orthostasis and Exercise	Diane M. Rotto
65	The Role of the Periosteum in Bone Demineralization	Christine J. Ruben
66	Simulation of Lightning Striking a C-580 Aircraft	Carlos Sanchez-Castro
67	Infrared Absorption Measurements of the V_4 Band of Silane in a Heated Cell	Randall J. Schadt
68	Characterization of 6061 Aluminum During Hot Deformation with Emphasis on Identification of Optimum Processing Parameters	Joshua W. Smith
69	Kinematics of the Visual Flow Field	Joseph Solomon
70	Method Validation to Detect Chemical Warfare Agent Simulants	Lori A. Streit
71	Computer Network Measures of Effectiveness	Russell D. Thomas
72	The Effect of Soman on Rat Brain Levels of Acetylcholinesterase and Choline Acteyitransferase	Terry L. Thompson
73	Bacteriologic Techniques for the Isolation and Identification of Legionellae	Eric A. Utt

Technical Report Number	Title	Graduate Researcher
74	Future Tactical Air Control System Database Design	Donald A. Varvel
75	Expanded Content Domains for the Air Force Spouse Survey	Peggy J. Vaughn
76	Median Filter Enhancement for Computer Recognition	Kevin J. Verfaille
77	Raman Spectroscopy Studies of Extrinsic P-Type Silicon	Michael Wager
78	Tactical-Surge Sortie Simulation Using OGERT	Ronald L. Wasserstein
79	Pattern-Directed List Processing in Ada	Kenneth Wauchope
80	Thermal Stability Characteristics of Silahydrocarbons	Dennis W. Weatherby
81	Coordinated Head and Eye Movement Position Measurement in a Visual Flight Simulator	Paul A. Wetzel
82	Acoustic Emission in Composites	Kevin M. White
83	A Delphi Methodology for Identifying and Prioritizing Network MOEs	Kurt Ziegler
84	The Effects of Nuclear Radiation on the Optical Characteristics of Poly-Methyl Methacrylate (PMMA)	Kevin D. Zook

2. Abstracts of the 1984 Graduate Student's Research Reports

EFFECTS OF TEMPERATURE AND REACTANT SOLVATION UPON THE RATES OF GAS-PHASE ION-MOLECULE REACTIONS

by

Anton F. Ahrens and Peter M. Hierl

ABSTRACT

The rate constants and the product branching ratios for the nucleophilic displacement reactions of CH_3O^- and $OH^-(H_2O)_n$ (where n = 0,1, or 2) with the methyl halides, and for the proton transfer reactions of CH_3O^- and $OH^-(H_2O)_n$ with acetonitrile and the hydrogen halides have been measured in the gas phase over the temperature range 200-500 K, using the AFGL selected ion flow tube (SIFT). The rate constants of the fastest reactions were found to be very close to the collision rate. Reactant solvation was found to decrease the rates of the nucleophilic displacement reactions, most significantly in the case of the least exothermic reactions, but was found to have little effect upon the rates of the proton transfer reactions. Likewise, increased temperatures decreased slightly the rates of the nucleophilic displacement reactions but had less effect upon the rates of the proton transfer reactions.

BOILING HEAT TRANSFER IN HEAT PIPE EVAPORATOR

by

Jay Ambrose

ABSTRACT

Efforts are described to further the development of the Double-Wall Artery Heat Pipe (DWAHP). This is a unique new design which has shown much potential as a high heat flux device. A correlation is presented which relates the evaporator temperature drop for a water saturated screen wick to the heat flux. This correlation provides good results for different screen materials and mesh sizes. In addition, a computer program was written to perform the basic standard design calculations and simulate operating temperatures of the DWAHP.

DEVELOPMENT OF A METHOD FOR CONSTRUCTING THE OBSERVER MATRIX FOR LARGE ORDER SYSTEMS*

by

Vicki Atkins

ABSTRACT

Controls are an important consideration in the design of dynamic systems. Currently control laws exist when there is complete knowledge of the components of the state vector associated with a system. But without enough sensors to measure the entire state accuretly we must in some way reconstruct the state. The question is then, how do we build the observer matrix with the information that we do know? It is also important that the method used be capable of handling a large number of state variables. I will approach the problem by studying the Luenberg Observer and examaning its limitations. Perhaps through modification of this technique I can develop an improved, more efficient, and more practical method. Hopefully significant performance as well as cost improvements can be realized.

*Miss Atkins experienced a personal tragedy during the summer which resulted in her early withdrawal from the program. Consequently no final report is available.

IMPROVEMENTS IN TIRE/SOIL MODELING TECHNIQUES

by

Joseph M. Badalamenti

ABSTRACT

A review of current tire/soil mathematical modeling techniques is presented along with comments on their areas of applicability and their inaccuracies. A radial-interradial spring tire model is developed that uses linear springs to interconnect the radial linear or quadratic springs. This causes one radial element's deflection to be dependent upon its neighbors' deflections, improving the accuracy of the vertical and drag force predictions.

COMPUTER IMPLEMENTATION OF NONPARAMETERIC RADAR DETECTORS

by

David C. Bauer

ABSTRACT

Radar detection performance degrades when the target signal contains high levels of nonstationary surface clutter. However, many nonparameteric statistics exist which may help improve radar performance. This report describes an existing detection program used as the baseline for this project and an existing signal generation program used to generate the data for the project. It discusses some of the nonparameteric statistics, a detection algorithm that uses these statistics and a method of converting computer generated input signals with stationary clutter to signls with nonstationary clutter. In particular, it discusses the methods and the motivation for implementing these concepts on a computer. Finally, it proposes possible further research areas.

RESEARCH INTO THE DEVELOPMENT OF A STRUCTURE-MEDIA INTERACTION MODEL FOR DYNAMIC FINITE ELEMENT ANALYSIS

by

Robert L. Bigelis

ABSTRACT

The various parameters which have been used to characterize structure-media interaction (S.M.I.) modeling is investigated. The SAMSON2 dynamic finite element code used by AFWL for S.M.I. problems uses a slideline model to determine interface behavior. It is recommended that the slideline algorithms in SAMSON2 be modified to model both the friction associated with soil failure and sliding near the interface and the friction associated with interface failure and sliding. This is in contrast to the single general friction model currently in the code. A S.M.I. element should then be developed and installed into the code together with the Matrix Difference Equation Theory algorithms. Experimental testing of soil-structure interaction behavior should then be conducted in order to better estimate the parameters governing the newly installed element.

PHOSPHOLIPID METABOLISM IN A SYNAPTIC MEMBRANE PREPARATION ISOLATED FROM CEREBELLAR CORTEX

by
Scott B. Bischoff
and
Robert V. Dorman Ph.D.

ABSTRACT

The cerebellum is involved in the control of voluntary motor activity. In turn, the functioning of the cerebellum depends on the membrane phenomena related to the uptake, release and effects of neurotransmitters. We have examined some aspects of membrane biochemistry in a synaptic preparation isolated from bovine cerebellar cortex. We have detailed some metabolic pathways, in order to obtain basic information on the interactions of neurotransmitters and excitable membranes. We employed a purified gomeruli fraction, which contains intact synaptic structures, for investigation of phospholipid metabolism.

The purified glomeruli fraction contains the ethanolamine and choline phosphotransferase enzymes. These enzymes are necessary for the synthesis of the major membrane phospholipid components. We characterized these enzymes and estimated their kinetic constants. The properties of these enzymes are similar to those reported for other brain regions. We also found that the glomeruli particles can incorporate exogenous fatty acids into the membrane lipids. This mechanism may be used for further studies on the complex relationship between neurotransmission and membrane lipid metabolism.

AGING BEHAVIOR OF RAPIDLY SOLIDIFIED Ti-Co AND Ti-Cr-Al ALLOYS

BY

Philip & Blosser

ABSTRACT

The feasibility of developing high strength titanium alloys containing eutectoid-forming elements is being explored via rapid solidification (RS) processing. Near eutectoid Ti-Co and Ti-Cr-Al alloys were both conventionally cast and rapidly solidified into ribbons by the melt spinning process. Aging treatments were carried out on these specimens at sub-eutectoid temperatures for varying times. Microstructural characterization was carried out by optical microscopy using the Nomarski interference contrast technique, scanning electron microscopy and transmission electron microscopy. The aging hardening response was studied by measuring microhardness values.

The as-quenched ribbon and solution treat/quenched bulk specimens of both alloys showed a retained beta microstructure. Aging below the eutectoid temperature resulted in rapid precipitation of a very fine proeutectoid alpha phase followed by a eutectoid decomposition of the beta phase into alpha and intermetallic compound (Ti_2Co and $TiCr_2$). In the RS ribbons precipitation occurs more rapidly and more uniformly in comparison to conventionally cast specimens. The hardness peak for the Ti-Co alloy was found to occur at times which are three orders of magnitude shorter than for the Ti-Cr-Al systems. The hardness peak for both alloys corresponds to the formation of fine proeutectoid alpha phase. No hardening due to intermetallic compound was evident.

New Phenoxy Substituted Dianhydrides

by

Donna Brandelik

ABSTRACT

Synthesis of 3-phenoxypyromellitic dianhydride from durene was initiated and the intermediate compounds were fully characterized. The results showed that these intermediates were very soluble in common solvents. The final product is still under investigation. A model compound, 9-oxo-xanthene-1-carboxylic acid, was synthesized and partially characterized. The final product needs further analysis. Suggestions for future research are outlined to further advance this project.

STOCHASTIC BEHAVIOR OF RANDOM LAY CABLES

By

Frederick C. Breslin

ABSTRACT

The analysis of EMP effects depends on parameters which in effect may be random variables. One such example is the physical orientation of a cable within a structure. Further there are situations where a parameter may be deterministic, e.g., terminal impedance, but to investigate system behavior over a broad range of possible terminations one is forced to treat terminal impedance as a random variable. In this report we develop a model for a random lay cable with random termination and derive the stochastic properties of the associated electromagnetic matrices of interest.

THE USAF ORGANIZATIONAL ASSESSMENT PACKAGE: FOUR CRITICAL DECISIONS

by

Jan Leeman Brooks

ABSTRACT

Choices at four major decision points faced by researchers using factor analysis were compared first through a review of their theoretical bases and second through application of methods to a set of data. The purpose of the study was to determine what choices would be most suitable for use with the proposed revision to the Organizational Assessment Package used by the Leadership and Management Development Center. The decision points include: extraction technique, rotation criterion, number of factors rule, and the procedure for estimating scores, including the technique for weighting, and the technique for computing composites. Only the first comparison, the theoretical bases, is reported here; a more comprehensive version of this report will appear as one section of a technical report to be published by the Leadership and Management Development Center. That report will include the second comparison, the application of methods to a set of data. Recommendations regarding each of the four decisions are made.

THE CALCULATION OF MODE II ENERGY RELEASE RATE IN THE DELAMINATION OF COMPOSITE MATERIALS

by

Howard W. Brown

ABSTRACT

An approximate method for the evaluation of mode II energy release rate in the delamination of composite materials is investigated. The model is a cantilever beam consisting of a unidirectional composite material with a midplane starter crack at the free edge. A modified method of a theory developed by Whitney and Sun is used to evaluate the displacement field and the distribution of interlaminar stresses caused by the loading at the free edge. The results of this modified theory indicate pure mode II delamination of the cantilever. Suggestions for future research in this area are offered.

INFRARED MEASUREMENTS OF DISILANE PRODUCTION FROM A D.C. DISCHARGE IN SILANE

by

Robert F. Cheney

and

Randall J. Schadt

ABSTRACT

Infrared absorption spectra in the region of 800 to 1200 cm^{-1} were obtained of the effluent gas from a d.c. discharge run with 1% silane in Argon. Spectra were obtained with a Fourier transform spectrometer with a resolution of 1 cm^{-1}. The absorption cell was a White-type cell with a 20.25m path length. By comparing measured spectra with calibration spectra taken with same apparatus, both silane and disilane concentrations in the effluent gas could be measured. Total pressures of 1.0 to 2.0 Torr and d.c. discharge currents of .2 to 1.5mA produced a disilane-formation-to-silane-loss ratio of 2 to 17%.

FINITE ELEMENT MODELING OF A WALL UNDER BLAST LOADS

by

Susan M. Cheney

ABSTRACT

The results of several blast tests on reinforced concrete boxes are attempted to be duplicated by a finite element model using the computer code Abaqus. Half of the front wall of the box is modeled. Loading data is drawn from the results of the blast tests. Two models are developed, a larger one where the properties of the steel and concrete are smeared together, and a smaller one where the horizontal and vertical steel rebars are modeled. The concrete material model available with Abaqus is used. Preliminary results were obtained by the end of the research period, and a description of the further work to be done is included.

ANALYSIS OF J-79, J-57, AND TF-33 JOB ANALYSIS QUESTIONNAIRE ASSESSING TASK DIFFICULTY

by

Michael D. Coovert

Abstract

A very specific job analysis questionnaire was developed in order to measure relative difficulty of specific tasks on three different engines. Descriptive statistics were run comparing specific items with their more general item form found on the CODAP surveys. A between engine difference was found on phase two tasks, with J-79 tasks being rated more difficult than the tasks for the J-57 and the TF-33. Additionally, descriptive statistics were utilized to compare the specific tasks to the more generalized form found on the CODAP Surveys. There appears to be only small differences between the specific versus the more general item forms.

THE PHYSIOLOGIC CHARACTERIZATION, PREDICTION, AND BIOFEEDBACK TREATMENT OF MOTION SICKNESS

by

William E. Czelen, M.D.

ABSTRACT

This report describes an effort to more fully characterize the physiologic manifestations and variation induced by motion and motion sickness and is directed at providing an automated biofeedback system to treat the disorder in aircrew.

Work is underway on several facets of a multidisciplinary effort directed to medical considerations, biomedical design, engineering, computer hardware design, component interfacing, and software development. These energies are directed toward the acquisition and analysis of physiologic data to more effectively describe, predict, treat, and ultimately obviate motion sickness with biofeedback techniques.

The areas to be discussed in this report include:

1.) A review of the general descriptors of motion sickness
2.) Discussion of the incidence and susceptibility factors
3.) The anatomical correlates of motion sickness
4.) Overview of the motions causing the disorder
5.) Current state of theories of motion sickness etiology
6.) Current status of treatment/prevention regimens
7.) Background of biofeedback applications
8.) Biophysical, instrumentation and engineering considerations
9.) System organization
10.) Current system status and required future effort

Jennifer Davidson

ABSTRACT

This report presents an algorithm for segmenting FLIR imagery which contain bridges. The algorithm uses edge based segmentation and the concept of reverse-parallel line segmentation to isolate target-like regions.

The algorithm is coded in Fortran and is available along with a users guide at the Image Processing Lab at Air Force Armament Laboratory, Eglin AFB.

Computer-Based Optimization Algorithms for LOGAIR Cargo Allocation

by

Dr. Kendall E. Nygard
Timothy R. Downes

Abstract

This report describes a mathematical formulation for modeling the LOGAIR system. It also discusses other contributions made during the summer research program.

The LOGAIR system is a privately contracted airlift system providing daily air cargo service to 56 bases in the continental United States (CONUS). The Air Force manages and controls the operation which uses 16 separate routes. Allocation of cargo to system capacity is presently handled manually by controllers stationed at WPAFB and various Air Logistics Centers located elsewhere.

Because of the limited efficiency of manually allocating cargo, and the great potential for human error, a way of mathematically modeling the allocation process and incorporating this model into a computer-based allocation system is investigated. The discussion centers on how certain aspects of the allocation process can be modeled as a multi-period generalized assignment problem, while other aspects could be modeled as a multicommodity capacitated transshipment problem.

Although the above formulations are difficult combinatorial optimization problems, recent studies suggest that the allocation models could be solved daily on a microcomputer. The mathematical models developed to date are presented and suggestions made for further research in development of the model and for implementing this model as the basis of a computer-based allocation system.

CALCULATION OF ENHANCED HEATING IN TURBULENT BOUNDARY LAYERS INFLUENCED BY FREE STREAM TURBULENCE

by

Paavo Sepri and Jon L. Ebert

ABSTRACT

A preliminary phenomenological computational model has been formulated and implemented for the purpose of predicting increased heating in boundary layer environments which are influenced by free stream turbulence. The model has been constructed primarily by scrutiny of recently published extensive flow measurements over heated flat plates, and it is also supported partially by analytical considerations. The mixing length model existing in the code STANCOOL has been modified to incorporate these free stream turbulence effects. The comparisons between measurements and calculations generally show improvement, but certain discrepancies are noted which require further investigation. An apparently novel observation is made concerning the structure of much of the outer region of a turbulent boundary layer in the presence of higher levels of free stream turbulence. Several variables follow a simple exponential character which may be of fundamental importance. This observation is used to lend credence to the computational model, but it also raises an apparent dilemma involving the energy equation. A central role in these calculations is played by the turbulent Prandtl number profile, the modeling of which determines quantitatively the heating of a surface. Comments are offered in connection with possible channel flow effects on measurements of Pr_t which indicate large decreases towards the free stream.

MULTIPLE TURBINE DISK SIMULATION USING ALPID

by

James R. Farmer

ABSTRACT

This report discusses the results of a first stage in computer modelling of a three dimensional multiple turbine disk forging using the two dimensional finite element code ALPID (Analysis of Large Plastic Incremental Deformation). Contained is a brief mathematical overview of the theory behind ALPID and the results of a pseudo-symmetric plane of the forging. The direction of further work is suggested.

THE EFFECTS OF NUCLEAR RADIATION ON THE OPTICAL CHARACTERISTICS OF (SiO_2-ZrO_2 on Si SUBSTRATE) MIRRORS

by

Mark A. Ferrel

ABSTRACT

The military has a lot of interest in the effects of nuclear radiation on the optical characteristics of laser components for future weapons systems. If the radiation effects can be modeled, then the amount of damage in a given situation could be predicted.

The mirrors (which were SiO_2-ZrO_2 on a Si substrate deposited for maximized reflectivity at a wave length of 1.315 μm) have a 50% Iodine laser damage threshold of 36.11 J/cm^2. The mirrors were exposed to no irradiation. The equation which best fit the data is below. D is the percent damage at a given laser pulse energy level and P is the laser pulse energy level in mJ.

$$D = \frac{100}{\pi} \arctan \left[.565(P-10.78)+.0038(P-10.78)^3+.000096(P-10.75)^5\right]+50$$

A least squares fit was used fit the function to the data. The standard deviation for this fit is ± 10.51% damage.

It was also found that given a constant laser power as mirror reflectivity decreases the amount of damage increases. This is expected since the mirror is absorbing more of the laser energy at low reflectivities. A mirror with 83% reflectivity had a 50% laser damage threshold of 27.81 J/cm^2, while the mirrors with 98% reflectivity had a 50% damage threshold of 36.11 J/cm^2.

As soon as the data is available from the irradiated mirrors, the data will be similarly analyzed and modeled.

THE EFFECTS OF PSYCHOPHYSICAL MATCHING ON THE TRANSFER OF TRAINING BETWEEN ALTERNATIVE MOTION SIMULATORS

by

John M. Flach

ABTRACT

In this study psychophysical matching techniques were employed to equate the subjective experience of motion between two alternative motion simulation devices--the RATS, a full-body motion environment and the ALCOGS, which presented motion cues through a moving seat pan. The psychophysical matching technique, designated SIGMA, for Subjective Interactive Gain Measurement Analysis, resulted in equivalent roll-axis tracking performance between the two simulators. However, training subjects in the ALCOGS using the motion drive algorithm derived using the SIGMA technique did not result in better transfer between simulators than training with no motion cues.

Paul Gader

ABSTRACT

This report presents an algorithm for segmenting FLIR imagery which contain bridges. The algorithm uses edge based segmentation and the concept of reverse-parallel line segmentation to isolate target-like regions.

The algorithm is coded in Fortran and is available along with a users guide at the Image Processing Lab at Air Force Armament Laboratory, Eglin AFB.

NEUROTRANSMITTER SYSTEMS IN THE CEREBELLAR GLOMERULUS:

ANALYSIS OF GABA UPTAKE, EXCHANGE, AND RELEASE

by

Carolyn L. Green
David M. Terrian, Ph.D.

ABSTRACT

The cerebellar glomerulus is being utilized by this laboratory as a model for investigating chemical integrative processes in local neuronal circuits. In this report, we give evidence to support the suggestion that 4-Aminobutyric acid (GABA) functions as an inhibitory neurotransmitter in this synaptic complex. Cerebellar glomeruli were isolated from the bovine cerebellar vermis in high purity (93%) and subjected to an extensive series of in vitro biochemical analyses. These experiments revealed that glomerular particles release [^{3}H] GABA, in a Ca^{2+}-dependent manner, in response to membrane depolarization and are endowed with a high affinity uptake system capable of rapidly terminating the inhibitory action of this amino acid. However, the functional implications of these findings could not be clearly interpreted until the relative contribution of GABA exchange had been quantitatively examined and controlled for.

Kinetic analysis indicated that cerebellar glomeruli accumulate [^{3}H] GABA at two different high affinity sites, their affinities (Km) were calculated to be 2.2×10^{-6}M and 3×10^{-5}M. Although an exchange of [^{3}H] GABA with the endogenous pool of GABA clearly contributed to the uptake measured in these experiments, at least 50% of the [^{3}H] GABA accumulated by glomerular particles is stored in an osmotically-sensitive, nonexchangeable pool. These transport sites were not further distinguished from one another in experiments which measured their temperature sensitivity, sodium dependency, responsiveness to metabolic inhibitors, or substrate specificity. These results suggest that a heterogeneous population of interactive neuronal uptake sites comprise a single transport system responsible for the net accumulation of GABA in cerebellar glomeruli.

Glomerular particles preloaded with [^{3}H] GABA exhibited a Ca^{2+}-independent release of this amino acid in response to membrane depolarization. However, the depolarizing agents (K^+ and veratridine) used in these experiments are known to increase the inward transport of Na^+ which, in turn, would stimulate the Na^+-dependent homoexchange of GABA. It is demonstrated that, when one displaces [^{3}H] GABA from this exchange pool, a K^+-evoked and Ca^{2+}-dependent release of [^{3}H] GABA occurs. The observed net uptake of GABA together with the depolarization-induced, Ca^{2+}-dependent release of GABA from glomerular particles strongly indicates that functionally active GABAergic synapses are present in this structure.

A Dynamic Approch to Airframe Cost Estimation

by

Bruce R. Harmon

ABSTRACT

Traditionally cost estimation for military airframe programs has ignored important aspects of economic theory. The progress function has been the dominant analytical tool used in relating production quantities to airframe cost. Efforts have been made to synthesize the progress function with neoclassical economic production and cost theory. The most promising of these efforts posits a dynamic cost function where the production process is modeled taking into account the effects of learning and production rate. This research examines this approach and provides an empirical test of its validity. To do this a dynamic cost model is applied to the F-4 airframe program and parameters are estimated using historical production data.

A READOUT ELECTRONICS DESIGN FOR AN INFRARED ARRAY

by

Thomas L. Hayward

ABSTRACT

The Air Force Geophysics Laboratory (AFGL) has obtained a 58x62 gallium-doped silicon DRO array from Santa Barbara Research Center. This array will be used for ground-based infrared astronomical observations in the 10 micron band on the Wyoming Infrared Observatory (WIRO) 2.3-meter telescope. The estimated infrared background radiation from the telescope and the earth's atmosphere requires very fast readout electronics for this device. A preliminary design, based on Motorola MC68010 microprocessors running at 10 MHz, is presented in this report. Two 68010's will handle preliminary co-adding of data as they come from the array, dumping the co-added data to the WIRO PDP-11/34 minicomputer at regular intervals. Other elements of the system, including a preliminary co-adding routine for the 68010, are discussed briefly. A discussion of the work yet to be done concludes the report.

The Factor Analysis Methodology Applied to MOE Categorization and Evaluation

by

Ron Hightower

ABSTRACT

An introductory discourse on network MOEs (measures of effectiveness) provides the reader with a brief background and comments on some of the problems associated with MOEs. Following this the methodology of factor analysis is outlined and its applicability to MOE analysis is explained. The three phases of the method are demonstrated using actual MOEs. First the intercorrelation coefficients of the MOEs are calculated. This is followed by the actual factor analysis which in this paper was done using the Principal Axis Method. The results of the analysis are interpreted and the method as a whole is evaluated. Recommendations are made as to improvements of the method.

THE "PROCESSING WINDOW" FOR THE NEAR BETA Ti-10V-2Fe-3Al ALLOY

by

Joseph M. Hjelm

ABSTRACT

The effect of hot deformation and post deformation heat treatment on the development of grain structure in the Ti-10V-2Fe-3Al alloy was studied in this project. It has been shown that a combination of deformation temperature, total strain, and post deformation heat treatment can provide a "processing window" yielding an equiaxed recrystallized grain structure.

The determination of the "processing window" of commertial Ti-10V-2Fe-3Al was the object of this project. Test coupons, taken from the ingot, were forged to a 30% (36% true strain) reduction at die temperatures ranging from 815°C (1500°F) to 1230°C (2200°F). These were then annealed for 1 hr in vacuum at temperatures between 870°C (1600°F) and 1343°C (2450°F). From these tests we found that a "processing window" does exist, with the lowest minimum annealing temperature being 1175°C (2150°F) at a forging temperature of 980°C (1800°F). Suggestions for further research in this area are also offered.

VEHICLE AND CREW SCHEDULING IN AIRLIFT OPERATIONS

by

Arthur M.B. Hogan
Dr. M. Jeya Chandra

Abstract

This paper addresses the analytical solution of crew allocation and vehicle scheduling encountered by certain divisions of the United States Air Foree. The paper reports the formulation of a general decision model as a mixed integer programming problem, the computational complexity involved in obtaining an analytical solution, and transformations to allow the application of heuristics in obtaining suboptimal solutions. A heuristic to solve the integer linear program formulation was implemented.

A Design for Minimum Eigenvalue Sensitivity

Subject to Selected Modal Insensitivity

by

Thomas H. Hopp

ABSTRACT

The problem of assigning eigenvalues with minimum sensitivity to system parameter changes is well represented in the literature, and traces it's roots back to Jacobi. Designing a system with modes which are insensitive is a more recent development reported in the literature. When *modal insensitivity* is enforced on some of a system's eigenvalues it has been reported that the remaining eigenvalues become more sensitive to parameter changes. In this report the techniques of minimum eigenvalue sensitivity and modal insensitivity are combined to provide system designs which will not have increased sensitivity of the eigenvalues which were not made insensitive. The computer program MACSYMA, developed at MIT, is used extensively in calculating the example.

DIGITAL LQR DESIGN FOR ADVANCED TACTICAL AIRCRAFT - STOL APPROACH

by

Robert F. Hoskin

ABSTRACT

The integration of flight control and engine control subsystems for an advanced tactical fighter is an important topic under investigation. The use of Digital Linear Quadratic Regulator Theory to control a linear system model (STOL approach) of the advanced aircraft/engine model is investigated. Digital LQR design produced a system which is stable, but not completely satisfactory due to long settling times and large state deviations. Recommendations to improve simulation techniques and aircraft/engine performance are discussed.

George Howard, Jr.

ABSTRACT

Hyperbaric oxygen was found to affect adversely the electrophysiological response of the retina to light in rats fed a diet deficinet in both vitamin E and selenium. Both vitamin E and selenium are micronutrients thought to play essential roles in preventing in vivo lipid peroxidation. Rats fed diets supplemented with vitamin E and/or selenium and treated with 2.0 ATA (atmospheres absolute) of 100 percent oxygen for 1.5 hours per day for 4 weeks did not show any decrease in electroretinogram response. The retina is known to be particularly susceptible to oxidative damage caused by in vivo lipid peroxidation. Dietary antioxidants appear to provide protection from hyperbaric oxygen damage to the rat retina.

THE DISTRIBUTIONAL ANALYSIS OF CONTRAST SENSITIVITY MEASURES

by

Marc W. Hunter

ABSTRACT

Visual contrast sensitivity measures were obtained using a video display that generated vertical sine-wave gratings. Threshold contrasts were determined using three different methods of stimulus presentation: Bekesy Tracking (Experiment 1), and the methods of adjustment and increasing contrast (Experiment 2). An inverted-U described the general form of contrast sensitivity functions for all three psychophysical methods, thus confirming that visual resolving power is best at intermediate spatial frequencies and progressively less keen at relatively extreme frequencies. The data from the Bekesy Tracking procedure were collected into separate distributions for the ascending and descending trials, and deconvolving the former distribution from the latter resulted in a model that was exponential in form. This analysis of component processes suggested that contrast sensitivity measures are comprised of at least two component processes, only one of which reflects sensory sensitivity, the other(s) having to do with undesired response-criterion bias. In general, the results indicate that the method of increasing contrast generates the most "criterion-free" measures of contrast sensitivity. These measures could serve as the best predictor of the contrast sensitivity required in other tasks, such as performance in a visual simulator, in which precise visual resolution is essential.

INDIVIDUAL AND GROUP DYNAMICS: A CONSIDERATION OF CLIMATE, TASK DESIGN, AND COMBAT READINESS FACTORS OF THE OAP/OAS

Joseph F. Kager

ABSTRACT

The purpose of this review was to explore individual and group dynamics underlying the measurement and feedback processes employed by the Leadership and Management Development Center's consulting service. Factors examined were climate, task design, and combat readiness. Findings suggest that additional understanding of the processes may be gained by considering individual and group influences independently, and that aggregating individual, perceptually measured factors to group level constructs may not always be justified. Recommendations were made concerning factor measurement, through the Organizational Assessment Package (OAP), and feedback of each of the enumerated factors.

EXPERIMENTAL ANALYSIS OF PRESSURE SWING ADSORPTION

by

John C. Kayser

ABSTRACT

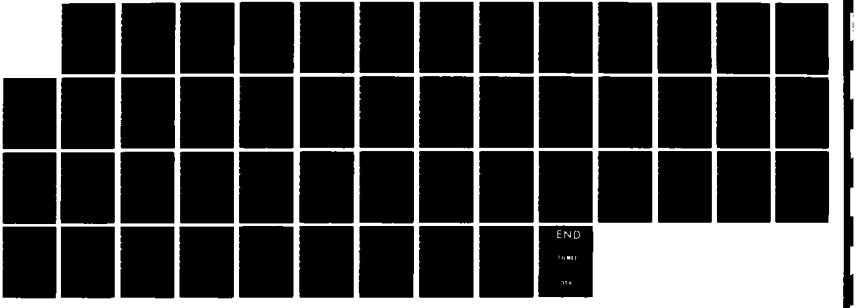
The United States Air Force is currently assessing the separation of oxygen from air using pressure swing adsorption (PSA) for use on board aircraft. A recently developed theoretical model for PSA (Knaebel and Hill [1]) is experimentally tested by separating oxygen from air at 45°C and 45 psia (feed pressure). Molecular sieve 5A adsorbent is used in a two-bed, six-step PSA cycle. The theory accurately predicts the maximum recovery of oxygen as a function of the pressure ratio within 8%. In simple breakthrough experiments the model predicts the slope of six linear equilibrium isotherms with an average deviation from the actual values of 5%. The model should be a useful tool in future USAF performance studies of PSA units.

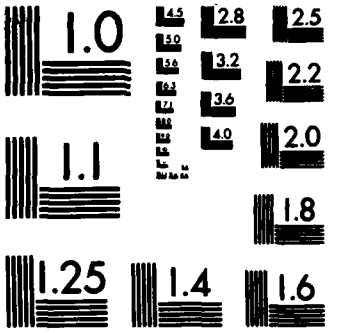
The experimental work is performed under conditions favorable to the assumptions of the theoretical model. Recommendations are given for future theoretical and experimental development under less favorable conditions. Additional experimental work could significantly expand the utility of the theory.

AD-A154 299 USAF/SCEEE GRADUATE STUDENT SUMMER RESEARCH PROGRAM (1984) PROGRAM MANAGE..(U) SOUTHEASTERN CENTER FOR ELECTRICAL ENGINEERING EDUCATION INC S..

2/2

UNCLASSIFIED W D PEELE ET AL. OCT 84 AFOSR-TR-85-0475 F/G 5/1 NL





TACKLING THE I/O BOTTLENECK

by

Nancy K. Kirkwood

ABSTRACT

Knowledge-based expert systems make heavy demands on the machines supporting them. In particular, when a large body of knowledge is paged into secondary storage, the critical problem is the "I/O bottleneck" as the pages of data are brought in for processing. In the following, I review research into handling this problem, covering the range from hardware to software, and including new decentralized machines, VLSI memories, database machines and other special purpose architectures, pipelining and parallelisms, locality of reference, and cognitive economy. Proposals are made for increased knowledge about patterns of reference, a survey of current symbolic languages, implementation of promising "paper" machines, and generally a closer harmony between the architecture of the machine and the architecture of the algorithms for its use.

A Range Update Algorithm for the Data Handling/Recording System

by

Guy F. Klose

ABSTRACT

The Harris Data Handling/Recording System (DH/RS), by using the Westinghouse Auto-Q, is capable of real-time screening and classification of targets from forward-looking infrared imagery, but presently has no provision for automatically updating target range and velocity. An algorithm is developed for the estimation and tracking of range and velocity given target cue information provided by the Auto-Q. Range is estimated from target size and velocity is estimated from the relation of changes in range and time elapsed between estimations. After a suitable model of target dynamics is developed, tracking is provided by the one-step prediction of target states. The classic $\alpha\beta$ Tracker is then implemented as part of the DH/RS software. Suggestions for the continuation of this project have also been presented.

John Kreuter

Abstract

When the Dod issued the directive making Ada the standard high level computer language, a need was created to determine the capabilities of Ada in such areas as artificial intelligence. Libraries of packages both with general application and with specific usefullness to artificial intelligence need to be developed. One appraoch is to develop Ada packages which will mirror the capabilities of languages such as Lisp and Snobol which have proven their utility in solving AI questions. Our summer research group took this approach and began the development of Lisp-like list processing packages -- undertaken by my colleague Ken Wauchope -- and Snobol-like pattern matching packages -- undertaken by this author. Viewing pattern matching as an extended parsing problem, Ada packages for pattern matching utilizing the more efficient (time-wise) Earley Algorithm were developed, as well as packages implenting the more traditional backtracking (recursive descent) approach. Since the full Ada language was not available to us this summer at Lowry AFB, these efforts should be considered as preliminary, with the implementation of the algorithms in the richness of the full Ada language, and an analysis of the run time space requirements still needing to be accomplished.

OPTICAL THIN FILM COATING DAMAGE VIA PULSED LASERS

By

Michael R. Lange

Abstract

The absorbing inclusion model of pulsed laser induced damage in thin films is revisited and generalized. A solution is derived that can facilitate arbitrary absorption functions and pulse shapes. It is also shown that this model applies to regions previously excluded when the wavelength dependence of Mie absorption by an inclusion in a thin film is taken into account. The model reveals that flouride film damage is thermally dominated with absorption that appears generally material independent, but wavelength dependent. Furthermore, it also shows that thermal diffusion plays an important part in oxide film damage, however, there is apparently some material dependence not accounted for in the present model. It is postulated that this material dependence enters through the absorption process. As might be expected, absorption in oxide films is also shown to be wavelength dependent.

REPROCESSING OF BARNES TRANSMISSOMETER DATA

by

Barry R. Lemieux
and
Martin A. Patt

ABSTRACT

Under NATO project OPAQUE, large data files were collected for subsequent processing by the Air Force Geophysics Laboratory. The validity of some of the supplemental 1400-meter Barnes transmissometer data stored in processed hourly-files was suspect. The data has been carefully studied and a determination has been made that the 1400-meter Barnes data was not valid. The processing error which resulted in the bad data was found, and the hourly data files were subsequently reprocessed.

A COMPUTER SEARCH FOR M_{11} AS A GALOIS GROUP OVER $\mathbb{Q}$

by

Eric E. Liverance

ABSTRACT

Two methods of calculating Galois groups of polynomials are presented. Their use in conjunction with one another is discussed and is probably the most efficient means known to compute Galois groups. Stauduhar's method is improved for degree $n \leq 5$ by explicit calculation of resolvents. Finally, an unsuccessful computer search for M_{11} as a Galois group over $\mathbb{Q}$ is presented. The search is based on Van der Waerden's method.

DYNAMIC FLOW STRUCTURES IN A BLUFF-BODY COMBUSTOR

by

Steven A. Lottes

ABSTRACT

Results from a study of photographs and high speed movies of reacting flows with and without heat release in an axisymmetric bluff-body combustor are reported. Laser sheet-lighting directed in both horizontal and vertical planes provided a remarkably detailed visualization of large scale structures and their dynamic evolution in the recirculation zone behind the bluff-body. The visualization was created by laser light scattered from micron sized particles generated by chemical reaction in the mixing regions of the flowfield. The structure of the flow under various operating conditions, mixing mechanisms, and the role of vortex shedding is discussed. Results indicate that the dynamics of large scale three-dimensional structures in the flows studied play a significant role in mass exchange between regions of the flows and in mixing processes which control chemical reaction in the flows.

THERMAL MAPPING DATA REDUCTION IN NON-SEMI-INFINITE SOLID REGIONS OF WIND TUNNEL MODELS

by

James Evans Lyne

ABSTRACT

The error in the values of heat-transfer coefficient calculated using the semi-infinite solid (SIS) equation is investigated for hemispherical nosetips, wing leading edges, and two-dimensional corners. Finite-element and analytic computer models are used to predict thermal responses for the various configurations; a comparison is made of the actual input convective boundary conditions and those calculated via the SIS equation from the thermal response. It is found that the calculated estimate is conservative by approximately 10-40% for all geometries investigated. The exact error is determined to be dependent on heating level and distribution as well as geometry. Suggestions for further study in this area are offered.

OPTICAL BISTABILITY WITH LIQUID MEDIA:

EXPERIMENTAL STUDIES AND THEORETICAL PREDICTIONS:

by

N. M. Lawandy

and

D. L. MacFarlane and W. S. Rabinovich *

ABSTRACT

We have experimentally studied optical bistability (OB) in a Fabry-Perot etalon containing a variety of nonlinear liquid media in the quasi steady state limit. We have studied Kerr effect OB using CS_2, 1,2,dichloroethane, and the effects of the single photon absorber Kodak 9860 dye on this process using Q-switched laser pulses at $1.06\mu m$. This work indicates that previous studies using BDN dye dissolved in 1,2,dichloroethane were misinterpreted as the solvent alone can contribute to hysteresis via Kerr effects. In addition we have observed for the first time OB in a liquid using two-photon excitation. These experiments were performed using Rhodamine 6G in methanol solvents. Finally, we have undertaken a theoretical study of the transient response of an adiabatically following, non-dispersive, absorptive medium in a cavity. The results predict an asymptotically stable transient analogous to relaxation oscillations in laser systems. Preliminary experimental results indicate that we may have observed this effect.

* Mr. D. L. MacFarlane and W.S. Rabinovich were graduate students actively participating in this work.

The "Processing Window" For the Near Beta Ti-10V-2Fe-3Al Alloy

by

John K. McKelvey

ABSTRACT

The investigation for a "processing window" in Ti-10V-2Fe-3Al which has been hot forged to a 65% reduction was investigated. The process was carried out by deforming the specimens first to 30% reduction and then to 50% reduction. The deformed specimens were then annealed between the temperatures of 815°C (1500°F) and 1225°C (2235°F). It was then possible to evaluate the recrystallization process due to the fact that the annealed specimens show the original grain boundaries concurrently with the newly recrystallized grains.

INCORPORATING THE MATRIX DIFFERENCE EQUATION THEORY INTO THE SAMSON2 DYNAMIC FINITE ELEMENT COMPUTER CODE

by

Steven S. Miller

ABSTRACT

In this report, I have introduced three steps that were taken toward reaching my summer objective of determining where the Matrix Difference Equation (MDE) Theory can be incorporated into the SAMSON2 code to effect efficiencies in the numerical algorithms of the code. The three steps taken were: (1) familiarization with the operation and use of the SAMSON2 code; (2) investigation of the code for the constant strain triangle; and (3) preparation of a tape of the SAMSON2 code. These steps were also very important to be performed in order to prepare me for future research activities.

I also proposed to continue research on the SAMSON2 code in two areas: (1) to incorporate the MDE Theory into SAMSON2; and (2) to look at the higher-ordered elements in the code in order to determine why these elements don't work.

CALCULATION OF CORRELATION FUNCTION AND SELF-ENERGY CONTRIBUTION FOR NON-DIAGONAL RESPONSE FUNCTIONS

by

Margarita M. Miro-Julia

ABSTRACT

The purpose of this paper is to find analogies between Turbulent Fluid Dynamics and Many Body Theory for an unbound incompressible fluid in turbulent motion.

The Navier-Stokes equation was considered and modified by the introduction of the Reynolds stress term in its matrix form with constant coefficients. Applying Perturbation Theory, this added term produces non-diagonal response functions. Corrections due to viscosity are then calculated, and general expressions for the correlation function tensor $C_{ijkl}(\vec{k},\omega)$ and self-energy matrix $\Sigma_{lk}(\vec{k},\omega)$ are obtained.

INDIVIDUAL DIFFERENCES IN SPATIAL ABILITY: THE ROLES OF PRACTICE AND SYNTHESIS

by

Paul D. Nichols

ABSTRACT

The purpose of the two experiments reported here is to contribute to a process theory of spatial ability. The first experiment had three phases: a 96-item pretest, a 288-trial learning phase, and a 96-item posttest. The results supported the hypothesis that subjects tend to unitize spatial stimuli with extended practice. In the second experiment, subjects were asked to construct figures by mentally synthesizing three, four, five, or six line segments and then to decide if a part was contained in the synthesized figure. Results supported the hypothesis that spatial ability means skill in creating mental representations of objects which preserve configural information.

ACETYLCHOLINE AS A NEUROTRANSMITTER IN PURIFIED BOVINE GLOMERULUS PARTICLES

by

Edouard L. Noisin

ABSTRACT

A procedure for obtaining purified glomerulus particles from bovine cerebellum has been developed. This preparation yields a final product which is more than 90% pure. Enzyme assays for choline acetyltransferase and acetylcholinesterase activities indicated the presence of endogenous acetylcholine in purified glomerular fractions. The uptake of ^{3}H-choline into the glomerular fraction was examined as functions of choline, Na^{+}, and hemicholinium-3 concentrations in the incubation medium. The results indicated that uptake of choline into purified glomerulus particles was Na^{+}-dependent. Hemicholinium-3 at a concentration as low as 5 μM inhibitted choline uptake by about 80%, suggesting the presence of high affinity choline transport. K_t, the choline concentration giving half-maximum transport, was calculated to be 1.1 μM for the Na^{+}-dependent system. These experiments present some preliminary evidence for the possible role of acetylcholine as a neurotransmitter in purified bovine glomerulus particles.

SEMI-INSULATING GaAs CHROMIUM-DOPED BUFFER LAYERS

by

David Paul Norton

ABSTRACT

Semi-insulating GaAs buffer layers were grown with various Cr content. Hall measurements were performed on the samples to determine type, mobility and carrier concentration. N-type layers with carrier concentration at approximately 4×10^{14} cm^{-3} were grown on Cr-doped substrates. Finally, n-type layers (8×10^{14} cm^{-3}) were grown on top of the semi-insulating buffer layers.

AN ELMENTARY MODEL OF THE INTERIOR BALLISTICS OF A TWO-STAGE LIGHT GAS GUN

by

Raymond M. Patin

ABSTRACT

A time-dependent volumetric model of the operation of a two-stage light gas gun is derived. The gas generation process in the combustion chamber is described by a model derived by O. K. Heiney. Piston and sabot kinematics are determined from the axial momentum equations without friction. The pressure-volume relationship in the light gas (helium) chamber is assumed to be isentropic. Piston extrusion effects in the pump tube nozzle are accounted for through a retarding force which is proportional to the stress-strain relationship for the piston material. Comparisons of performance predictions with experimental data indicate a correct simulation of actual trends. Additional work is suggested in adjusting the piston face - sabot base pressure relationship to allow the model to match a wide range of experimental data.

EVALUATION OF TRAINING PERFORMANCE FOR THE USAF CRITERION TASK SET (CTS)

by

Dr. Robert E. Schlegel

David W. Patterson

ABSTRACT

A study was conducted to determine the required number of training sessions for subjects to achieve asymptotic performance on the Criterion Task Set (CTS) information processing performance battery. The CTS is composed of nine tasks which measure independent information processing resources. One task measures perceptual input, six tasks measure central processing and two tasks measure motor output.

Twenty subjects were divided into four groups. One group trained on all nine tasks. The other three groups trained on different three-task subsets. All subjects trained for two hours per day on five consecutive days.

Performance measures for the majority of tasks included response time and accuracy. Subjective workload measures were also obtained. Preliminary analysis of the data indicates similar learning patterns for the nine-task and three-task groups with all groups demonstrating rapid improvement on most tasks. Recommendations for further data analysis and research extensions are also provided.

THE FUNCTION OF HUMAN OPERATORS IN THE CONTROL FACILITIES OF WIND TUNNEL 4T

by

Michael J. Patterson

ABSTRACT

This research centered on the system operation of a control facility for a dynamic process (i.e. wind tunnel facility). This report reviews the application of an engineering psychology approach to identify constraints in information and communication flows within the system. These specific areas were evaluated and recommendations were made to increase the overall system effectiveness by reducing the impact of these constraints.

THE EFFECTIVE CONDUCTIVITY OF LAYERED CLOTH HEAT PIPE WICKS

by

Jon R. Phillips

ABSTRACT

Heat conduction through a layered cloth wick saturated with a working fluid is investigated. The mechanisms of conduction are discussed in light of cloth geometry and packing conditions. Two one-dimensional models are proposed to describe the behavior of the conduction mechanisms. The first model combines the series and parallel models in order to use the positive aspects of both. The second model includes "mean gap" terms to establish greater sensitivity to the working fluid conductivity. A physical description of the test apparatus fabricated to verify the models is also discussed. Suggestions for additional research both on the conduction models and the test apparatus are offered.

SYNTHESIS OF ACETYLENE TERMINATED SULFONE (ATS) CANDIDATES

by

Debra K. Picklesimer

ABSTRACT

Certain acetylene terminated sulfone (ATS) systems are of interest as possible replacements for epoxy resins. The beneficial feature which the ATS systems are expected to offer is their insensitivity to moisture. Reaction schemes for their synthesis are outlined. Finally, the synthesis of certain of the intermediates required for the ATS candidates are reported and discussed and recommendations for future work in this area are presented.

DYE LASER SYSTEM DEVELOPMENT AND BEAM DATA ACQUISITION METHODS

by

Benjamin Lee Pruitt

ABSTRACT

The design of two basic components of a LIDAR, the high powered laser and the signal detector are discussed. The principles of operation and system development of a high powered, pulsed, single stage, plane parallel dye laser are presented. Single photodiodes and photodiode arrays are used to collect data from the dye laser beam. Different applications of each type of detector are explored. Microprocessor controlled circuitry is developed to accomplish the data acquisition and preliminary analysis. Recommendations are given for further efforts in this research.

OPTICAL BISTABILITY WITH LIQUID MEDIA:

EXPERIMENTAL STUDIES AND THEORETICAL PREDICTIONS:

by

N. M. Lawandy

and

D. L. MacFarlane and W. S. Rabinovich *

ABSTRACT

We have experimentally studied optical bistability (OB) in a Fabry-Perot etalon containing a variety of nonlinear liquid media in the quasi steady state limit. We have studied Kerr effect OB using CS_2, 1,2,dichloroethane, and the effects of the single photon absorber Kodak 9860 dye on this process using Q-switched laser pulses at $1.06\mu m$. This work indicates that previous studies using BDN dye dissolved in 1,2,dichloroethane were misinterpreted as the solvent alone can contribute to hysteresis via Kerr effects. In addition we have observed for the first time OB in a liquid using two-photon excitation. These experiments were performed using Rhodamine 6G in methanol solvents. Finally, we have undertaken a theoretical study of the transient response of an adiabatically following, non-dispersive, absorptive medium in a cavity. The results predict an asymptotically stable transient analogous to relaxation oscillations in laser systems. Preliminary experimental results indicate that we may have observed this effect.

* Mr. D. L. MacFarlane and W.S. Rabinovich were graduate students actively participating in this work.

NORMAL MODES ANALYSIS OF A 12-BLADED DISK USING THE SUBSTRUCTURING ANALYSIS OF NASTRAN

by

JOHN K. RAMSEY

ABSTRACT

Resonant frequencies and normal modes are calculated for a tuned 12-bladed disk using the automated multi-stage substructuring analysis of NASTRAN. The code is presented with explanations of each step. Explanations and illustrations of the assembly of the bladed disk are provided. Suggestions on modifying the code to represent a mistuned 12-bladed disk are also provided.

APPLICATION OF THE THIN LAYER NAVIER STOKES CODE

by

Christopher W. Reed

ABSTRACT

The Thin Layer Navier Stokes code was used to predict transonic flow around a GBU-15 store. Both the accuracy of the Thin Layer Navier Stokes code and the influence of the computational grid resolution were investigated. Results from the Thin Layer Navier Stokes code, when compared to experimentally determined pressure coefficients, indicate that the code has potential for solving complex transonic flow problems and that the effectiveness of adapting the grid resolution to solution gradients will be useful as the grid density is limited by computer capacities.

THREE DIMENSIONAL FINITE ELEMENT ACOUSTIC ANALYSIS

by

Joseph J. Rencis

ABSTRACT

The finite element computer program COMIC (COMplex AcoustIC Pressure Analysis) is evaluated to determine its full capabilities and accuracy. The accuracy of COMIC is assessed by comparing the finite element results to the analytical, experimental, and other numerical techniques. Within limitations, COMIC provides sufficiently accurate results. Recommendations are stated to increase the capabilities of COMIC as a general purpose acoustic finite element code.

AN OPTIMAL TRAJECTORY PROBLEM

by

Lila F. Roberts
and
John J. Swetits

ABSTRACT

A least cost model for determining an optimal trajectory for attacking multiple targets on a single pass of the attacking aircraft is investigated. A Quasi-Newton procedure and a Levenberg-Marquardt procedure for solving an unconstrained model are compared. A penalty-multiplier method for solving a constrained model is investigated.

AN EVALUATION OF A PARABOLIZED NAVIER-STOKES CODE FOR THREE-DIMENSIONAL FLARED GEOMETRIES

by

Karlin Renée Roth

ABSTRACT

The Parabolic Navier-Stokes (PNS) code was modified to include the geometric flexibility required to calculate the flowfield about cone-cylinder-segmented sidemounted flare configurations and cone-cylinder-elliptic flare configurations. Grid generation and sensitivity to smoothing parameters are two important aspects of the calculation. Results for these three-dimensional flared configurations are presented in the form of pressure distributions. Convergence of the PNS code for these geometries is successfully demonstrated.

CARDIOVASCULAR RESPONSES OF HIGH- AND LOW-FIT MEN TO HEAD-DOWN REST FOLLOWED BY ORTHOSTASIS AND EXERCISE

by

Debra K. Rotto

Diane M. Rotto

William G. Squires

ABSTRACT

Head-down rest (HDR), a ground-based simulation of weightlessness, minimizes the hydrostatic intra- and extravascular pressure gradients that are normally present in the upright position causing a headward fluid shift. As a result, adaptive changes in other body systems occur producing signs of orthostatic intolerance upon reexposure to normal gravitational forces. These adaptive changes seem to differ between the levels of aerobic fitness. With this in mind, a preliminary study was conducted in which a similar protocol to this human study was followed except dog models were used. However, the dogs were instrumented acutely and thus were under the influences of anesthesia and positive pressure ventilation so this must be taken into account when considering the results. The results indicate that a difference does exist between trained and untrained dogs in response to head-down rest (HDR). In view of the different parameters measured and the data collected, the trained dogs responded with a lesser degree of variation. In other words, the trained dogs displayed a more stable system enabling them to better contend with any perturbation they might encounter. The trained dogs seemed to be able to compensate physiologically for the disturbances they confronted, thus minimizing the physiological stress and maximizing the homeostatic state. On the other hand, the untrained dogs lacked this physiological stability causing a pronounced response to the HDR. Consequently, the training effect seems to allow one to respond to change (HDR or weightlessness) with minimal physiological stress. However, this may be detrimental to orthostatc tolerance. It becomes important then to take into account the aerobic fitness of an individual when dealing with the weightless environment.

CARDIOVASCULAR RESPONSES OF HIGH- AND LOW-FIT MEN TO HEAD-DOWN REST FOLLOWED BY ORTHOSTASIS AND EXERCISE

by

Debra K. Rotto

Diane M. Rotto

William G. Squires

ABSTRACT

Head-down rest (HDR), a ground-based simulation of weightlessness, minimizes the hydrostatic intra- and extravascular pressure gradients that are normally present in the upright position causing a headward fluid shift. As a result, adaptive changes in other body systems occur producing signs of orthostatic intolerance upon reexposure to normal gravitational forces. These adaptive changes seem to differ between the levels of aerobic fitness. With this in mind, a preliminary study was conducted in which a similar protocol to this human study was followed except dog models were used. However, the dogs were instrumented acutely and thus were under the influences of anesthesia and positive pressure ventilation so this must be taken into account when considering the results. The results indicate that a difference does exist between trained and untrained dogs in response to head-down rest (HDR). In view of the different parameters measured and the data collected, the trained dogs responded with a lesser degree of variation. In other words, the trained dogs displayed a more stable system enabling them to better contend with any perturbation they might encounter. The trained dogs seemed to be able to compensate physiologically for the disturbances they confronted, thus minimizing the physiological stress and maximizing the homeostatic state. On the other hand, the untrained dogs lacked this physiological stability causing a pronounced response to the HDR. Consequently, the training effect seems to allow one to respond to change (HDR or weightlessness) with minimal physiological stress. However, this may be detrimental to orthostatc tolerance. It becomes important then to take into account the aerobic fitness of an individual when dealing with the weightless environment.

The Role of the Periosteum in Bone Demineralization

by

Christine J. Ruben

Abstract

The periosteum has a thick outer fibrous layer and an inner osteoginic cellular layer. In order to study the cellular population of the inner osteogenic layer, the collagenic fibrous layer is treated with enzyme dissociation fluid.

Hyaluronic acid is an intercellular cement that binds connective tissues. Materials in transit through the tissue must diffuse through this gel, hyaluronic acid. Hyaluronidase accelerates the subcutaneous spread of crude collagenase, and glucuronidase. These enzymes cleaves the α polypeptide chains, freeing the cells of the osteogenic layers (4, 5).

SIMULATION OF LIGHTNING STRIKING A C-580 AIRCRAFT

by

Carlos R. Sanchez

ABSTRACT

Three dimensional Maxwell's equations are solved by using a finite difference method, and then used to model lightning striking a C-580 aircraft. The current pulse attaches to the nose of the plane, propagates through its body, and exits beneath the horizontal stabilizer. A finite difference code T3DFD, written by M. D. Rymes, Electromagnetic Applications Inc., was modified to achieve that purpose. It is shown how to treat the effect of an external current source by using a soft-lattice truncation condition that reduces numerical reflections. Suggestions are made on how to center the airplane in the grid space, so that the greatest amount of detail can be modelled. Further research options are offered.

INFRARED ABSORPTION MEASUREMENTS OF THE ν_4 BAND OF SILANE IN A HEATED CELL

by

Randall J. Schadt

and

Robert F. Cheney

ABSTRACT

Absorption spectra of the ν_4 band of silane were measured with a Fourier spectrometer at a resolution of 0.06 cm^{-1}. Measurements were accomplished after the silane (1% in Argon) was thermally excited to 250°C in a 31 cm. pathlength, Pyrex cell at a pressure of 133 Torr. The region for which absorption was measured covered 850 to 1000 cm^{-1}. Comparison between spectra at a temperature of 250°C to that of 21°C revealed the enhancement of some lines. These enhanced absorption lines either resulted from the excitation of higher rotational levels of the ground state or from the excitation of the first excited vibrational level. For this reason, this experiment is not definitive in identifying which line results from which of the two possible excitations. Therefore, the present study serves the purpose of providing initial identification of candidate lines for the transition from the first excited vibrational level of the ν_4 band of silane.

CHARACTERIZATION OF 6061 ALUMINUM DURING HOT DEFORMATION WITH EMPHASIS ON IDENTIFICATION OF OPTIMUM PROCESSING PARAMETERS

by

Joshua W. Smith

ABSTRACT

In any metal working process, the ultimate goal is to produce a uniform , fine grained product of optimum material properties. A dynamic material model of hot deformation processing is used in this paper to characterize an aluminum-silicon-magnesium alloy. Cylindrical specimens of 6061 aluminum alloy were processed by upset forging at temperatures from 573K to 823K and constant average strain rates of 10^{-4} s^{-1} to $10^{-1}s^{-1}$. The resulting stress-strain data were used to generate a three dimensional processing map plotting efficiency of power dissipation of the material as a function of the processing parameters.

Although further investigation is necessary, preliminary examination of the microstructure indicated that dynamic recrystalization may occur at a temperature strain rate combination of 723K and $10^{-1}s^{-1}$. If this is indeed the case, these processing parameters, when used with a suitable materials processing model, will allow the design of hot working processes which will produce products of optimum material properties.

KINEMATICS OF THE VISUAL FLOW FIELD

by

Joseph Solomon

ABSTRACT

To study the perception of motion, one needs to know what motion is. And in perceiving motion, the cause(s) may or may not be observable to the observer. What is observable is, generally, the styles or kinematics of the motion. In this paper, we analyze the kinematics of motion in order to understand the perception of motion. Physical motion can also be conceived as the description of the structure of the physical space. Hence, we also look into kinematic spaces so as to get a grasp of the visual space (kinematic space). The goal of the survey is to unravel the relationship, if any, between physical and visual kinematic spaces. In the sequel, we show that the kinematics of motion is directly given to the observer by the structure of the ambiant light and, hence, we conclude that visual space is an affine kinematic space. That is an observer perceives kinematic spaces.

METHOD VALIDATION TO DETECT CHEMICAL WARFARE AGENT SIMULANTS

by

Lori A. Streit

ABSTRACT

Passive dosimetry is an established technique which detects the concentration of contaminant gas vapors in air utilizing the principle of molecular diffusion. Current chemical defense interest focuses on developing a method to detect time weighted average individual exposure levels of toxic warfare agents using personal dosimeter badges. NIOSH and AFOSH have established part per million threshold limit values for most toxic gases therefore the dosimeters must be capable of accurately and reliably detecting microgram quantities of material. Hydrazine was chosen as the chemical warfare simulant studied because of its volatile, highly reactive nature. The dosimeter badges collect hydrazine vapors while rotating on a carrousel enclosed in a controlled atmosphere testing chamber. Colorimetric analysis reveals the concentration absorbed by each badge with a lower limit of 0.02 ppm. Validation of this method immerges from the examination of several critical parameters.

COMPUTER NETWORK MEASURES OF EFFECTIVENESS

by

Russell D. Thomas

ABSTRACT

This paper presents the following measures of effectiveness: Shortest Delay Path, Highest Reliable Path, Reachability, Maximum Throughput, Number of Link Independent Paths, Reliability, Connectivity, and two independently developed MOE's, Reliable Throughput and Network Reliablity.

ABSTRACT

THE EFFECT OF SOMAN ON RAT BRAIN LEVELS OF ACETYLCHOLINESTERASE AND CHOLINE ACETYLTRANSFERASE

by Terry Thompson

The increasing use of organophosphate insecticides and the possibility that behavioral changes may occur in the absence of somatic effects makes exact knowledge of the behavioral effects of these pesticides mandatory. Symptoms of organophosphate poisoning vary in rapidity of onset, severity, and duration depending on the specific compounds involved and a variety of other factors. It is the intent of this research project to investigate the secondary effects manifested by acute exposure of animals to the organophosphate Soman. We suggest that some of the behavioral signs seen in animals are possibly the result of secondary effects of soman induced acetylcholinesterase inhibition.

Therefore, the purpose of this study was to determine if the behavioral effects seen after a single toxic dose of soman involve other secondary effects mediated by enzyme inhibition.

BACTERIOLOGIC TECHNIQUES FOR THE ISOLATION AND IDENTIFICATION OF LEGIONELLAE

by

Eric A. Utt, B.S.

ABSTRACT

The development of a definitive rapid diagnostic protocol to facilitate the identification of the members of the family Legionellaceae was investigated. Traditional bacteriologic tests such as catalse, oxidase, urease, gelatinase, hippurate hydrolysis, tolerance to NaCl as well as staining were used. In addition, pigmentation and fluoresence on media containing various aromatic substrates and dye containing media were also investigated. Recommendations for presumptive identification of Legionellae were developed. Various culture media were also examined for their ability to support the growth and provide for the propagation of these organisms.

FUTURE TACTICAL AIR CONTROL SYSTEM DATABASE DESIGN

by

William Perrizo and Donald A. Varvel

ABSTRACT

Tactical command and control systems in the era of TACS-2000 and beyond will be distributed in order to maintain a sufficient degree of survivability. The underlying database system will also be distributed. It must respond quickly to both updates and requests for information, and must contain enough redundancy to sustain simultaneous losses of several elements. Few production distributed databases exist, and none appears suited to this application. This report details our work on designing a suitable database system. Our major work to date has been the areas of data replication, backup, and concurrency control. Suggestions for further research in this area are offered.

EXPANDED CONTENT DOMAINS FOR THE AIR FORCE SPOUSE SURVEY

by

Peggy J. Vaughn

ABSTRACT

The family unit has been shown to have increasing influence on individual family members. With awareness of this, the Air Force has exhibited appreciable concern for needs of the family. As a result, the Air Force is revising the Spouse Survey to aid in evaluation of these needs. Variables of particular concern to the Air Force are retention, job satisfaction, and readiness, and this review focused on the family's influence on these variables. Of primary concern to this research effort was determination of what measurable but here to fore untapped family factors impact on job-related variables. One research topic involved various family structures and how they might impact upon service members. A second factor concerned family stressors in the military, inclusive of mobility, separation, communication, and occupational demands. The findings of this literature review indicated that family factors have a definite impact on crucial aspects of a service member's career. Any comprehensive survey effort designed to explore family/career relationships should incorporate items appropriate to the reviewed domains.

MEDIAN FILTER ENHANCEMENT FOR COMPUTER RECOGNITION

by

Kevin J. Verfaille

ABSTRACT

Median filtering is used to enhance images for computer recognition.

First, median filters of various window sizes and shapes are applied to an image with a large amount of simulated salt - and - pepper noise in an effort to examine how median filter window shape and size affect image enhancement for computer recognition.

Once the best possible filter window is chosen from the above experiment it is used to filter a data base of thirty - four differently distorted images. The data base includes images distorted with Gaussian white noise, and salt - and - pepper noise. Again, the results will be used to determine how much median filtering improved computer recognition of degraded images.

Finally the combination of median filtering with inverse filtering will be tested for its ability to further improve computer recognition.

RAMAN SPECTROSCOPY STUDIES OF EXTRINSIC P-TYPE SILICON

by

James Schneider

and

Michael Wager

ABSTRACT

Raman spectroscopic studies of extrinsic p-type silicon samples were undertaken at temperatures of 300 K, 77 K, and near 4 K. These samples were conventionally doped with group IIIA elements. Using both incident light of a pulsed, frequency-doubled, Nd:YAG laser at 532nm and near IR laser pulses at 1064 nm, Raman scattering was investigated under several scattering geometries. With 532 nm light, the frequency shift of the LO phonon peak near 520 cm^{-1} in the Raman spectra of strained thin films of silicon on zirconia substrates was investigated by back scattering geometry. The weak Raman spectra from the doped impurities in bulk silicon samples was not observed with the visible incident radiation which is too strongly absorbed to penetrate the bulk of the sample. A study of the effect of a surface depletion layer on silicon samples of various thicknesses when used in Hall measurements to determine carrier concentration was conducted.

Tactical-Surge Sortie Simulation Using QGERT

by

Ronald L. Wasserstein

ABSTRACT

A simulation model for the tactical-surge sortie crew ratio problem has been developed using the QGERT simulation language. The simulation program allows the user to model the surge under a wide variety of circumstances, and to determine the effects of changes in certain parameters on crew ratio requirements. A front-end processor has also been developed to allow use of the simulation program without knowledge of QGERT.

PATTERN-DIRECTED LIST PROCESSING IN ADA

by

Kenneth Wauchope

ABSTRACT

A pattern-directed list processing facility for the Ada programming language is presented. Pattern lists for matching against source lists are constructed from a set of SNOBOL4-derived primitives which have been extended to be applicable to arbitrarily complex LISP-like data structures. Patterns may also contain user-defined symbols, which can serve as nonterminal symbols of a context-free grammar. Basic list creation and manipulation are made available to the programmer via a package of pseudo-LISP functions and data types. Several examples of possible applications in Artificial Intelligence are explored--focussing on computational linguistics problems such as transformational grammar and parsing--demonstrating the construction of patterns and the use of various operations available for testing and manipulating the values which the matcher returns.

THERMAL STABILITY CHARACTERISITCS OF SILAHYDROCARBONS

by

Vijay K. Gupta and Dennis W. Weatherby

Abstract

The silahydrocarbon class of materials were selected for investigation to provide candidate fluids usable over the temperature range of -54°C to 315°C. Thermal and hydrolytic stability of these fluids were the two main areas of concern. The following four silahydrocarbonschosen for investigation were: $CH_3Si(C_{10}H_{21})_3$, $CH_3Si(C_8H_{17})_2(CH_2)_3CH(CH_3)_2$, C_2H_5 Si-$(C_8H_{17})_3$ + C_2H_5 Si $(C_{10}H_{21})_3$, and $(CH_3)_2$ Si $CH(CH_3)_2C_{14}H_{29}$. The thermal stability studies of the above silahydrocarbons were conducted with respect to temperature, the heating time, the moisture content, and the nature of the metal container. It appears that silahydrocarbons $(CH_3)_2SiCH(CH_3)_2$-$C_{14}H_{29}$ and $CH_3Si(C_8H_{17})_2(CH_2)_3CH(CH_3)_2$ are slightly more stable as compared to the other two silahydrocarbons. The branching of one of the substituent group seems to have contributed to the added thermal stability. More than 90 percent of the silahydrocarbon CH_3 Si $(C_{10}H_{21})_3$ was decomposed when heated at 398.9°C for 6 hours, and there was little or no decomposition of the above hydrocarbon until the temperature of 329.8°C. The presence of 0.2% moisture and the metal container of the bomb material also have no significant impact on the thermal decomposition characteristics.

COORDINATED HEAD AND EYE MOVEMENT POSITION MEASUREMENT IN A VISUAL FLIGHT SIMULATOR

by

Paul A. Wetzel

ABSTRACT

Experiments were conducted on a Wide Field Hemispheric Display (WFHD) and the Fiber Optic Helmet Mounted Display (FOHMD) to determine the relationship between head and eye position for various target eccentricities within similar fields of view. The FOHMD experiments were conducted under two sets of initial conditions. In one set of trials, the target always returned to the same fixation reference point prior to the next stimulus, while in another set of trials, the initial fixation point moved sequentially from one position to the next without returning to a central reference point. The coordinated head and eye movement response for stepwise displacement of point source targets was obtained for each display. The coordinated response for tracking targets moving at a constant velocity from 10 to 80 degrees per second was also studied using the FOHMD. Angular head positions of yaw, pitch, and roll were measured by a helmet mounted potentiometer system, while horizontal and vertical eye position was measured by electrooculography (EOG). Position signals from both measurement systems were sampled by computer for subsequent analysis.

Kevin M. White

Abstract

Acoustic emission (AE) phenomena in composite materials is examined both theoretically and experimentally. Theoretically, the effect of material attenuation is introduced into an AE model to aid in separating source characteristics from propagation effects in measured AE signals. AE waveforms in composite samples were measured for controlled experiments. The source for these experiments was primarily restricted to the fracture of a single graphite fiber in an epoxy matrix and localized at a single point. The normal component of the surface displacement was measured at epicenter using a point contact, conical sensor. In contrast to previous work in this field, in analyzing the signals attention was focused on the initial portion of the AE waveform rather than long term signal behavior which is dominated by internal specimen reflections. For comparison, AE waveforms on fiber free samples are also shown.

A DELPHI METHODOLOGY FOR IDENTIFYING AND PRIORITIZING NETWORK MOEs

by

Kurt Ziegler

ABSTRACT

The identification of network MOEs (Measures Of Effectiveness) is an important first step in the design of network simulations. They provide a meaningful, well-defined way in which to describe the utility of a network, and thus give the network simulation some organization and and structure. MOEs, however, are all too often neglected by simulation designers. Often, this results in large, cumbersome simulations with questionable validity.

Many network MOEs have been defined or identified, but little agreement exists as to what MOEs are truly important to network simulations. Also, much ambiguity and duplication exists in the definitions of many of these MOEs.

A Delphi procedure could be used to identify and prioritize MOEs. The Delphi method is a technique for obtaining a consensus opinion from a group of experts. A Delphi procedure could help the present state of MOE development, providing simulation designers with meaningful, standard measures of effectiveness.

THE EFFECTS OF NUCLEAR RADIATION ON THE OPTICAL CHARACTERISTICS OF POLY-METHYL METHACRYLATE (PMMA)

by

Kevin D. Zook

ABSTRACT

The military has great interest in the effects of nuclear radiation on the optical components used in laser weapons systems. By modeling the effects radiation has on these components, the amount and type of damage that occurs can be predicted for a given situation.

Threshold damage was determined for samples of Poly-methyl methacrylate (PMMA) using a 1.06 μm Nd:YAG laser. Fifty percent damage was found to occur at fluence level of (36.6 ± .2) J/cm^2 for unradiated PMMA samples. This value was determined using least squares techniques on an arctangent function. The standard deviation was found to be ± 26.1 % damage. This large deviation was due to the inhomogeneity of the material.

Data from irradiated samples will be similarly analyzed and modeled as soon as possible.

END

FILMED

6-85

DTIC