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Group Picture from ILAS Conference in Lisbon

Second ILAS Conference held in Lisbon

Report by J. A. Dias Da Silva

The Second Conference of the International Linear Algebra Society took place in Lisbon from the 3rd to the 7th of August. The Conference was held at the Auditorium of the National Archives "Torre do Tombo" (plenary sessions) and at the Mathematics Department of the University of Lisbon (contributed sessions).

The total number of participants was 150 distributed as follows :

Australia:1 ; Belgium:1 , Brazil:1 ; Canada:5 ; Canada and Germany:1 ; China:2 ; Czechoslovakia:2 ; England:2 ; France:2 ; Germany:9 ; Greece:1 ; India:2 ; Ireland:2 ; Israel:10 ; Italy:1 ; Japan:2 ; Norway:2 ; The Netherlands:2 ; Poland:1 ; Portugal:43 ; Portugal and Macau:1 ; Slovenia:2 ; Spain:25 ; Sweden:2 ; Taiwan:1 ; U.S.A.:26 ; U.S.A. and Singapore:1.

Eleven one-hour-plenary sessions, 30 half-an-hour plenary sessions and 66 fifteen-minutes lectures were held during the Conference. The program and résumé of the sessions make part of the 1st appendix to this report.

The social program of the Conference included the Conference banquet on the 6th of August and a "Port of Honour" (a vin d'honneur) offered by the Lisbon Town Council on the 5th of August.

A Business Meeting of the International Linear Algebra Society was held on 4th of August.

The proceedings of the Conference will be published in a special issue of the Journal Linear Algebra and Its Applications. The special editors of this issue will be J. A. Dias da Silva, Chi Kwong Li and G. N. de Oliveira.

ILAS NEWS

Results of the ILAS 1992 Elections

The following have been elected in the recent ILAS elections for the term 1 March 1993 to 28 February 1995:

Vice-President
Secretary
Board of Directors

Graciano de Oliveira
Daniel Hershkowitz
Harm Bart and Paul van Dooren

ILAS is fortunate to have such an outstanding group of individuals willing to serve and provide leadership for the society. Indeed, the credentials of these four individuals are quite impressive.

Daniel Hershkowitz received the degrees of B.Sc, M.Sc. and D.Sc. from the Technion - Israel Institute of Technology. Since 1985 he has been a faculty member in the Department of Mathematics at the Technion. He has also held visiting positions at the University of Wisconsin - Madison.

Danny has won the Landau Research Prize in Mathematics (1982); the Technion's Award for Excellence in Teaching (1990); and the New England Award for Excellence in Research (1990), granted to the best researchers at the Technion. Danny is the author or co-author of more than 60 mathematical papers.

Since 1988, Danny has been as associate editor of *Linear Algebra and its Applications*, LAA. He has served as editor for several special issues of LAA.

Danny has been a member of the organizing committees of the 3rd, 4th, 5th, 6th, 7th and 8th Haifa Matrix Theory Conferences. He has also served on the organizing committees of the Inaugural Meeting of ILAS, Provo (1989), the 2nd ILAS Meeting, Lisbon (1992), the workshop on "Nonnegative Matrices, Generalizations and Applications", Haifa (1993), the 4th ILAS Meeting, Rotterdam (1994), and of the 5th ILAS Meeting, Atlanta (1995). He is an invited "New Generation Speaker" at the 3rd ILAS Meeting, Pensacola (1993).

Danny has been the secretary and member of the executive board and the board of directors of ILAS since its establishment in 1987. He is also the manager of ILAS-NET - the electronic newsletter of ILAS, and of IIC - the electronic information center of ILAS.

Paul M. Van Dooren was born in Tienen, Belgium, on November 5, 1950. He received the engineering degree in computer science and the doctoral degree in applied sciences, both from the Katholieke Universiteit te Leuven, Belgium, in 1974 and 1979, respectively.

From 1974 to 1977 he was Assistant at the Department of Applied Mathematics and Computer Science of the Katholieke Universiteit te Leuven. He was a Research Associate at the University of Southern California (Dept. El. Eng.-Systems) in 1978-1979, a Postdoctoral Fellow at Stanford University (Dept. El. Eng. and Dept. Comp. Sc.) in 1979-1980, a Visiting Fellow at the Australian National University (Dept. Syst. Eng. and Centre for Math. Anal.), a Senior Scientist at Philips Research Laboratory Belgium in 1980-1991 and a part-time Assistant Professor at the Universite Catholique de Louvain (Dept. Electr. Eng.) in 1989-1991. Since 1991 he has been a Professor of Electrical and Computer Engineering at the University of Illinois at Urbana-Champaign.

Dr. Van Dooren received the Householder Award in 1981 and the Wilkinson Prize of Numerical Analysis and Scientific Computing in 1989. He is an Associate Editor of *Systems and Control Letters*, *Journal of Computational and Applied Mathematics*, *Numerische Mathematik*, *SIAM Journal on Matrix Analysis and Applications*, *Applied Mathematics Letters*, *Linear Algebra and its Applications* and of *Journal of Numerical Algorithms*.

His main interests lie in the areas of numerical linear algebra, systems and control theory, digital signal processing, and parallel algorithms.

Harm Bart studied Mathematics at the Vrije Universiteit (Free University) in Amsterdam. After graduating in 1969, he continued at the same university as a Ph.D. student, working under the supervision of M. A. Kaashoek. In 1969 he received his doctorate on a thesis entitled "Meromorphic Operator Valued Functions". From 1973 to 1984 he worked at the Vrije Universiteit as a "scientific officer", with the understanding that he spent the academic year 1975/1976 at the University of Maryland. This stay in the U.S.A. was made possible by a grant from Z.W.O., the Organization for Zuiver Wetenschappelijk Onderzoek. In 1982 he obtained a part-time professorship at the Technical University in Eindhoven. In 1984 he was appointed Professor of Mathematics at the Erasmus University in Rotterdam (Department of Economics).

From 1969 to 1976, Harm Bart worked on analytic operator valued functions, first under the guidance of M. A. Kaashoek, later in collaboration with him and D. C. Lay (Maryland). In 1976/1977 he did research, jointly with S. Goldberg (Maryland), on periodic and almost periodic semigroups of bounded linear operators. After returning from the U.S.A. in the fall of 1976 he started cooperating with I. Gohberg (Tel-Aviv/Vrije Universiteit) and M. A. Kaashoek. This resulted in several articles and a monograph entitled: "Minimal Factorization of Matrix and Operator Functions". The factorization method developed (and applied) in this monograph has a strong systems theoretical flavor and led to an involvement in matrix theory problems. From 1985 on Harm Bart has focused on questions concerning the simultaneous reduction (by similarities) to special forms of pairs (or sets) of matrices. Several of his papers on this topic have been written jointly with G. Ph. A. Thyse (Rotterdam). Research in this area is still going on. Other work in process is concerned with certain function theoretic properties of Banach algebras.

From 1986-1992, Harm Bart was a director of the Econometric Institute of the Erasmus University in Rotterdam. In 1992 he was elected Vice-Dean of the Department of Economics. He has been the (co)organizer of several conferences and workshops. At this moment, he is the chair of the Organizing Committee of the ILAS 1994 meeting which will take place in Rotterdam.

(Editor's note: As of press time we have not received the essay describing the professional career of Graciano de Oliveira. Fortunately most ILAS members either know Professor Oliveira or are aware of the work he has done and the influence he has had on linear algebra. For further information about Professor Oliveira we refer the reader to the article "The Development of Linear Algebra in Portugal" in issue #2 of IMAGE.)

New ILAS Assistant Treasurer

Jeff Stuart has been appointed as Assistant Treasurer for ILAS. Jeff received his PhD in mathematics in 1986 at the University of Wisconsin Madison under the supervision of Hans Schneider. He was a visiting Assistant Professor at Northern Illinois University in 1986-87 and an Assistant Professor at University of Southern Mississippi, USM, from 1987-91. Since then he has served as an Associate Professor at USM. In Fall '91 he took a sabbatical and participated in the IMA special year in linear algebra.

Jeff has served as a referee for *LAA*, *LAMA*, *SIAM J. Matrix Analysis and J Combinatorial Theory*, book reviewer for *SIAM Reviews*, reviewer for *Math Reviews*, and as a member of the local arrangements committee for ILAS Pensacola Conference (March '93). His research interests are in combinatorial matrix theory.

UPDATE ON THE ILAS PENSACOLA MEETING

PURE AND APPLIED LINEAR ALGEBRA: THE NEW GENERATION

Third Conference of the International Linear Algebra Society

March 17-20, 1993

SPONSORS: The University of West Florida and The International Linear Algebra Society

CONFERENCE LOCATION: The University of West Florida and the Pensacola Hilton Hotel in Pensacola, Florida

The following is a list of those "New Generation" and "Invited Speakers" who have submitted, as of 12/15/92, the title of their talks.

New Generation Speakers

R. B. Bapat	<i>König's Theorem and bimatroïds</i>
Bart De Moor	<i>Numerical linear algebra in real engineering problems</i>
Robert M. Guralnick	<i>Commuting and triangular sets of matrices</i>
Roy Mathias	<i>The numerous applications of block matrices</i>
Volker Mehrmann	<i>A new look at canonical forms of matrix pencils</i>
Dianne P. O'Leary	<i>The block quasi-newton method</i>
A. C. Ran	<i>Dissipative matrices in indefinite inner product spaces</i>
Ion Zaballa	<i>Similarity and block similarity</i>

Banquet Speaker

Paul Halmos	<i>Fifty two years of linear algebra</i>
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Invited Speakers

T. Ando	<i>Young's inequalities for matrices</i>
Joseph A. Ball	<i>Linear algebra and matrix function theory</i>
Richard Brualdi	<i>The IMA year (1991-1992) on applied linear algebra</i>
Edward W. Formanek	<i>The Cayley-Hamilton Theorem</i>
Thomas Kailath	<i>Displacement structure, generalized Schur algorithm and rational interpolation</i>
Steven Leon	<i>ATLAST: Augmenting the Teaching of Linear Algebra through the use of Software Tools</i>
Margaret Wright	<i>Linear algebra in quadratic programming: the old, the new, the unknown</i>

There will be a panel discussion featuring Paul Halmos on his book "I Want To Be A Mathematician: An Automathography." The discussion will deal with some of the ideas that Professor Halmos has expressed in his book.

The following new generation speakers have also indicated that they plan to participate in our conference: George Cybenko, Daniel Hershkowitz, Chi-Kwong Li and Helene Shapiro.

In addition to the new generation speakers, the following invited speakers have indicated they plan to participate in our conference: A. C. Antoulas, Wayne Barrett, Rajendra

Bhatia, Gene Golub, Robert Grone, Nicholas Higham, Roger Horn, Charles Johnson, Peter Lancaster, Thomas Pate, Steve Pierce, J. A. Dias da Silva, Frank Uhlig, and Richard Varga.

There will be a minisymposium on sparse matrix algorithms organized by John Gilbert and Alex Pothén which will tentatively have the following four speakers: Steve Vavasis, Barry Peyton, Paul Plassmann, and John Gilbert. We are also hoping to have a meeting of the Linear Algebra Curriculum Study Group and there are also some very exciting announcements that will be made at the conference itself.

For additional information on the conference and a call for papers see Issue 9 of *IMAGE*, page 3, or contact

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Olga Taussky Todd/John Todd Lecture Series

report by James R. Weaver and Hans Schneider

It is a pleasure to announce that the International Linear Algebra Society is initiating the Olga Taussky Todd/John Todd Lecture Series at the 3rd Conference of the International Linear Algebra Society in Pensacola, Florida, March 17-20, 1993. Helene Shapiro has been chosen by the Program Committee from a number of excellent nominees to be the first lecturer in this series.

The funding for this series has been started by a number of generous contributions from people all over the world who admire and respect the Todds for their many contributions to the mathematics community for so many years. We are very hopeful that the Todds will be at the Pensacola Conference to be a part of this new series of lectures.

ATLAST 1993 Workshops

ATLAST is an NSF-ILAS Project to Augment the Teaching of Linear Algebra through the use of Software Tools. The project will offer five faculty workshops during the summer of 1993 on the use of software in teaching linear algebra. Workshop participants will learn about existing commercial linear algebra software packages and will be trained in the use of the MATLAB software package. Attendees will learn how to effectively incorporate computer exercises and laboratories into undergraduate linear algebra courses.

Participants will learn to design computing exercises at a level suitable for assigning to an undergraduate linear algebra class. These exercises will be class-tested during the school year following the workshop and then submitted to the project director for inclusion in an edited manual which will be distributed to the workshop attendees. A selection of these exercises will be included in an *ATLAST* Project Book. This book will be published by one of the mathematics societies with the provision that its contents will be public domain. Participants' contributions will be acknowledged in both the manual and the Project Book.

The *ATLAST* Project provides room and board for participants attending the workshops. In addition, participants will receive a \$200 stipend for their submitted exercises.

The *ATLAST* project was conceived by the Education Committee of the International Linear Algebra Society (ILAS) and is funded through the National Science Foundation Undergraduate Faculty Enhancement Program. Steven J. Leon of the ILAS Education Committee is serving as the *ATLAST* Project Director and the Assistant Director is Richard

E. Faulkenberry. Both are in the Department of Mathematics at the University of Massachusetts Dartmouth.

This is the second year of *ATLAST* workshops. The five workshops offered during the summer of '92 were a rousing success and we are confident that the '93 workshops will be even better!

ATLAST 1993 Linear Algebra Workshops Sites

Workshop site:	Michigan State University, East Lansing, Michigan
Workshop dates:	June 17-19, 1993
Workshop Presenter:	Dr. Steven J. Leon, UMass Dartmouth
Workshop site:	Los Angeles Peirce College, Woodland Hills, California
Workshop dates:	June 24-26, 1993
Workshop Presenter:	Dr. Jane Day, San Jose State University
Workshop site:	University of Houston-Downtown, Houston, Texas
Workshop dates:	July 8-10, 1993
Workshop Presenter:	Dr. Eugene Herman, Grinnell College
Workshop site:	Georgia State University, Atlanta, Georgia
Workshop dates:	July 15-17, 1993
Workshop Presenter:	Dr. Kermit Sigmon, University of Florida
Workshop site:	University of Maryland, College Park, Maryland
Workshop dates:	July 22-24, 1993
Workshop Presenter:	Dr. David Hill, Temple University

All teachers of undergraduate linear algebra courses at colleges or universities in the U.S. are invited to apply for the *ATLAST* workshops. The deadline for applications is March 12, 1993. Late applications will be accepted on a space-available basis. Each workshop will be limited to thirty participants. A screening committee will review applications and notify applicants of its decisions by the beginning of April.

For application forms or further information about the *ATLAST* Project contact

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NEXT ISSUE OF *IMAGE* PLANNED FOR JULY 1993

IMAGE is edited by S. J. Leon and R. C. Thompson. The Production Editor is Ann Cox. News items for the next issue should be sent no later than June 1, 1993. to:

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All news of interest to the Linear Algebra community is welcome including: news of conferences, journals and books, upcoming events, and activities of members. E-mail appears to be the fastest and most efficient way to submit news items.

Future issues of *IMAGE* will contain feature articles on linear algebra activities in other countries. Articles should be no more than four pages in length. If you're a member of ILAS then *IMAGE* is your publication. It needs your support. Please keep us informed about the linear algebra activities in your country.

ILAS-NET

The International Linear Algebra Society also maintains an electronic news service *ILAS-NET* edited by Danny Hershkowitz. If you want to submit news items or to have your name added to the *ILAS-NET* distribution list, send a message to Danny at:

MAR23AA@TECHNION.BITNET

NEWS ITEMS

A Symposium for Adi Ben-Israel

Report by Yair Censor

We are pleased to announce a Symposium on Linear Algebra and Optimization dedicated to Professor Adi Ben-Israel on the occasion of his 60th birthday.

In recognition of the outstanding achievements of Professor Adi Ben-Israel in the areas of Linear Algebra and Optimization, the Department of Mathematics and the Department of Industrial Engineering and Management at the Technion, and the Department of Mathematics and Computer Science at the University of Haifa will host a One-Day Special Symposium.

The Symposium will take place in Haifa, Israel, on Sunday June 6, 1993, and will consist of invited lectures and a festive dinner in honor of Professor Ben-Israel.

The organizing committee of the Symposium consists of Aharon Ben-Tal, Faculty of Industrial Engineering and Management, the Technion, Avi Berman, Faculty of Mathematics, the Technion, Yair Censor, Department of Mathematics and Computer Science, the University of Haifa.

For further information please contact: A. Berman, E-mail : mar64aa@technion.bitnet, Fax: 972-4-225023, or write : Prof. A. Berman, Faculty of Mathematics, Technion, Technion City, Haifa 32000, Israel.

Immediately prior to the Symposium (May 31- June 4, 1993) will be the "Workshop on Nonnegative Matrices, Generalizations and applications". Following the Symposium (June 7 -10, 1993) will be the "8th Haifa Matrix Theory Conference". Both events will take place at the Technion in Haifa.

CALENDAR OF COMING CONFERENCES

January 13-16, 1993, Combined Meeting of the AMS and MAA, San Antonio, Texas

March 17-20, 1993, ILAS Conference, University of West Florida, Pensacola, Florida
Information: See article in this issue of *IMAGE*

Summer 1993, *ATLAST* Workshops on the Use of Software in Teaching Linear Algebra
Information: See article in this issue of *IMAGE*

June 1993, Special Month in Linear Algebra, Technion-Israel Institute of Technology, Haifa;
Eighth Haifa Matrix Theory Conference, Technion-Israel Institute of Technology, Haifa
Information: A. Berman, e-mail: MAR64AA@TECHNION.BITNET or D. Hershkowitz
(MAR23AA@TECHNION.BITNET)

June 1993, 12th Householder Symposium on Numerical Linear Algebra, Lake Arrowhead,
California
Information: Gene Golub, Computer Science Dept., Stanford University or Tony Chan,
Mathematics Department, UCLA

June 28 - July 9, Conference on Matrix Theory for Applications, University of Wyoming,
Laramie
Information: A. D. Porter, Math. Dept., Box 3036 University Station, University of Wyoming,
Laramie, WY 82071

August 16-19, Third SIAM Conference on Linear Algebra in Signals, Systems, and Control,
University of Washington, Seattle
Information: Biswa N. Datta, Dept. of Mathematical Sciences, Northern Illinois University

December 13-17, 1993 International Cornelius Lanczos Centenary Conference, North Car-
olina State University, Raleigh, North Carolina
Information: R. J. Plemmons, North Carolina State University, Raleigh, NC 27695-8205

August 15-19, 1994, ILAS Conference, Erasmus University, Rotterdam
Information: See future issues of *IMAGE*

August, 1995 ILAS Conference, Atlanta, Georgia, U.S.A.
Information: See future issues of *IMAGE*

FEATURE ARTICLE

Visit to Japanese and other Asian Universities

Report by B.N. Datta

Part I. Visits to Japan

1. Tokyo Denki University (TDU) - At TDU my hosts were professor Hiroshi Inaba of the Department of Information Sciences and Professor T. Kamabayshi of the Department of Mathematics. Professor Inaba is a well-known control theorist in Japan and the leader of a research group working mainly on infinite dimensional systems theory. Several of Professor Inaba's joint works are with two of his bright and very promising research students and colleagues, Mr. N. Otsuka and Mr. Ito. Their work makes heavy use of tools from linear algebra and operator theory. My research interaction with this group was mainly on linear algebraic aspects of the problems they are working on. Interestingly enough, this group is becoming increasingly interested in numerical aspects of control and systems theory research.

In 1988, I was invited by Professor Inaba to visit his department and give a short course on numerical methods in control theory. The two-week short course went extremely well and generated a considerable amount of interest and enthusiasm among the control theorists, mathematicians and computer scientists. Thus, the stage for this year's visit was set.

This time, besides my interaction with professors Inaba, Kamabayshi and their other colleagues on linear and numerical linear algebraic aspects of control theory research, especially on eigenvalue assignment problems, I gave three talks: two in the Department

of Information Science and one in the Department of Mathematics. The two talks in the Department of Information Science were on the large-scale and parallel computations in control and on the numerical aspects of control problems for large second-order models. The last talk was sponsored by the Tokyo IEEE Chapter. The talk in the Mathematics Department was on observer matrix equations and their relationship to the numerical methods for the eigenvalue assignment problem.

2. University of Tokyo - My hosts at the University of Tokyo were Professors Masao Iri and K. Murota, both from the Department of Mathematical Engineering and Instrumentation Physics. Professor Iri is very well-respected throughout the whole country as a pioneer in mathematical engineering education in Japan. Both mathematics and engineering communities in this country owe a lot to Professor Iri. Professor Iri stimulated interests of mathematicians to solve real-world problems and educated practicing engineers to acquire appropriate mathematical knowledge in their areas of research and applications. Professor Iri also contributed profoundly in the growth of mathematical programming in Japan [1].

Professor Iri is also internationally well-known for his scientific contributions in several areas of mathematics and engineering, such as network flow, graphs and matroids, numerical methods, computational geometry, and mathematical programming. He has delivered numerous invited lectures in many prestigious international conferences and serves on the editorial board of several distinguished journals, including the Japan Journal of Industrial and Applied Mathematics (formerly the Japan Journal of Applied Mathematics). He wrote a book on Network Flow, Transportation and Scheduling: Theory and Algorithms [2], following an invitation of the celebrated mathematician Richard Bellman.

I also discovered, to my great satisfaction, that Professor Iri, like me, is very much interested and quite active in bridging the gap of communication between mathematicians and engineers. This gap is not only very noticeable in the west, but also in Japan. A major difference here is that Japanese practicing and research engineers are far more motivated than their western counterparts and more knowledgeable in the mathematics they have been using in their work.

Professor Murota, a former student, and a current research collaborator and a colleague of Professor Iri, is mainly interested in matroid theory and its applications to systems theory. Tools here are combinatorial in nature. This is a very interesting and innovative approach to solving systems theory problems; however, I am not sure if it will have a longtime impact in systems theory research. I am not aware of any people in the west active in this research currently.

From the brief interactions I had with the Japanese scientists, I have the feeling that Japanese mathematicians, control theorists and engineers are very active in almost all areas of theory and applications of control theory: H^∞ control, robust control, adaptive control, infinite dimensional systems theory, abstract control theory, robotics, etc. In fact, as far as industrial applications of control theory techniques are concerned, Japan seems to be ahead of all the western countries, including the U.S.A. However, surprisingly, there are very little activities in the computational aspects of control and systems theory—especially, there are almost no activities in the area of large-scale and parallel computations in control. As mentioned earlier, all the current activities in this area (though they are very limited) are in the western world, mostly in the U.S.A.

Part II. Visits to Hong Kong, Macao, India and Singapore

1. Hong Kong - Here I visited City Polytechnic of Hong Kong and the University of Hong Kong. In City Polytechnic, my host was Dr. Daniel Ho of the Department of Applied Mathematics.

I found this department very active in applied research and several members of the department are internationally visible. Their research interests include scientific computing applied to transport modelling, computational fluid dynamics, vibrating systems, heat transfer, computational aspects in control and systems theory, optimization theory, etc. Dr. Ho is a specialist in computational and applied control theory. He has published joint papers in the area of H control theory, output feedback problems, computer aided control theory, etc. in collaboration with some internationally known mathematicians and control theorists such as Fletcher, M. J. Grimble, etc. His research is funded by research grants from the polytechnic.

Dr. Ho belongs to a group led by Professor James Caldwell that is working on scientific computation and its applications. One of Professor Caldwell's strengths is his ability to attract researchers from engineering and other applied science areas to work in the area of applied mathematics. For example, his joint work with Dr. Y. M. Ram, a mechanical engineer, has resulted in publications in several SIAM journals, in the area of vibrating systems. Dr. Caldwell's research is funded by overseas agencies.

I gave two talks on large-scale and parallel computations in control theory and had some informal discussions with Drs. Caldwell, Ho, Ram, etc., which I found to be extremely productive. I look forward to a continued research collaboration with this group.

My host at the University of Hong Kong was Dr. Raymond Chan, a young numerical linear algebraist who has already received international recognition by winning the prestigious Leslie Fox award. His research interests include numerical linear algebra with applications to differential equations and signal processing. He has collaborated with well-known numerical linear algebraists such as Robert Plemmons.

The department is active in research both in pure and applied mathematics. Some of the internationally recognized researchers of the department are Drs. Y. H. Au-Yeung (linear and multilinear algebra), M. C. Liu and K. M. Tsang (analytic number theory), K. Y. Chan (differential equations and mathematical modelling), M. K. Siu (combinatorial number theory), S. C. K. Chu and T. G. Yung (operations research applied to mathematical modelling), Dr. R. Chan (numerical linear algebra, numerical differential equations, signal processing, etc.), et al. The department is headed by A. J. Ellis, who pursues his research in functional analysis and convexity theory.

Over the years, the department has produced many mathematicians who now hold important positions in business, government and education, both locally and internationally. Many of their graduates hold professional appointments in some of the leading universities of the world, such as Harvard, Stanford, and Berkeley.

Hong Kong seems to be in the forefront of research in modern mathematics and scientific computing. There are adequate research and computing facilities and there is a sincere desire to expand their research horizons and be recognized in the western world.

2. Macao - During my stay in Hong Kong, I made a one-day trip to Macao to visit the University of East Asia there. This university is relatively unknown to the world. Here my host was Professor Graciano de Oliveira, an internationally renowned linear algebraist from Portugal, who has been a visitor to the university for the last year. He and his wife, who is a numerical analyst, are trying to build research in certain areas of mathematics, especially in the area of linear and numerical linear algebra. The university has a very pleasant surrounding.
3. Singapore - In Singapore, I visited the mathematics department of the National University of Singapore. There my host was Dr. Tara Nanda, a numerical analyst, who received his Ph.D. from the Courant Institute of Mathematical Sciences in New York and did postdoctoral work with Professor Beresford Parlett at Berkeley. Dr. Nanda is

currently engaged in developing an interactive educational software package in numerical analysis, which appears to me very interesting and innovative.

My talks on large-scale and parallel computing in control were very well received and attended not only by mathematicians but also by several researchers from electrical engineering. I was told the engineers normally do not attend mathematics colloquia and the attendance of several engineers to my talks was a pleasant surprise.

My visit to the electrical engineering department revealed that there are some serious research projects being carried on by several members of the department and the engineers are ready and welcome opportunities to collaborate with mathematicians. The researchers at the NUS have access to national supercomputing facilities; however, the facilities are under used.

I found, to my distress, that their program for visitors is not well motivated and organized. Occasionally, the university spends a huge amount of money to bring very distinguished visitors such as some Nobel laureates; which is fine, but I am sure, it is not of much help to build research. A systematic program to bring active researchers from around the world to help build research in certain focused areas is lacking.

4. India - I visited India upon an invitation from the Government of India to be a scientific advisor. My visit was funded by the United Nations Development Plan. This was indeed an extremely well-organized program. I spent the first two weeks in the city of Bangalore, one of the most prominent centers for scientific research and technological development in India.

I was officially hosted by the Department of Computer Science and Automation of the Indian Institute of Science (IISc). My host there was Professor N. Viswanadham, an internationally renowned control theorist. I visited several departments in IISc such as the Institute for Supercomputing Education headed by Professor Rajaraman, Microprocessor Applications Laboratory, headed by Professor Patnaik, etc. I also visited several government funded research laboratories. They included the Center for Development of Advanced Computing, headed by Dr. U. S. Shukla, the Central research Laboratory of Bharat Electronics, headed by Dr. Paulraj, Centre for Artificial Intelligence and Robotics, headed by Dr. M. Vidyasagar, CMMACS at National Aeronautics Laboratory, headed by Dr. K. S. Yajnik.

My visits to these places revealed that India is in the era of supercomputing. India has acquired a CRAY from the United States recently and this is being used in weather prediction research at the Indian Meteorological Department in Delhi; the supercomputing institute at the Indian Institute of Science is in the process of getting a CRAY XMP from the United States. Besides these, India has already built a transputer-based type distributed-memory computer PARAM at the Centre for Development of Advanced Computing in Pune, and is in the process of building others in Bangalore and other places. These computers are presently being used in applied research such as speech synthesis, pattern recognition, image processing, robotics, radar signal processing, computational fluid dynamics, artificial intelligence, space research, etc. [4]. One bottleneck in using these computers has been the lack of suitable parallel scientific software. Indian scientists have been trying to develop some, but that will be a challenge. Besides these, several microprocessor-based architectures and appropriate software are being developed, notably at the Microprocessor Applications Laboratory in IISc.

The last two weeks of my visit were spent at the Indian Institute of Technology, Kharagpur in West Bengal, India. Here I was hosted by Professor Kanti Bhushan Datta, a well-known control theorist in Electrical Engineering Department. Besides giving a series of three talks on large-scale and parallel computing applied to power systems and control research, I visited the departments of Computer Science, Mechanical and Aerospace Engineering.

I found there was a sincere desire among the engineers and computer scientists to develop collaborative research blending mathematics, computer science, and engineering.

Acknowledgements

I am thankful to the office of Naval Research, Asian office in Japan for a grant to attend the MTNS '91 and to visit Japanese Universities. Dr. David Kahaner was the co-ordinating scientist. Thanks are also due to the government of India, United Nations Development Program, and the universities and research laboratories in Japan, Hong Kong, Singapore, Macao and India mentioned in the report for their excellent hospitality and financial support. I shall be happy to give any one the regular mail addresses or whenever possible electronic addresses of any scientists and educators mentioned in my report.

References

- [1] M. Iri, Growth of Mathematical Programming in Japan.
- [2] M. Iri, Network Flow, Transportation and Scheduling, Academic Press, New York, 1969.
- [3] Research Newsletter, Dept. of Applied Mathematics, City Polytechnic of Hong Kong, January, 1991
- [4] An Overview of CRL Projects, a publication of the Central Research Laboratory of Bharat Electronics, India; April, 1991

JOURNAL NEWS

LINEAR ALGEBRA AND ITS APPLICATIONS (LAA)

Special Issues in Progress

Title: Numerical Linear Algebra in Control, Signals and Systems
Special Editors: Gregory Ammar, Volker Mehrmann, Nancy K. Nichols,
and Paul Van Dooren
Submission Deadline: July 31, 1992

Title: Special Issue Honoring Ingram Olkin
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Submission Deadline: August 31, 1992

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