$$\begin{bmatrix} I & L \\ A & S \end{bmatrix} \quad \bullet \xrightarrow{\mathcal{I}} \bullet \xrightarrow{\mathcal{M}} \bullet \xrightarrow{\mathcal{A}} \bullet \xrightarrow{\mathcal{G}} \bullet \xrightarrow{\mathcal{E}} \bullet \quad \begin{bmatrix} I & L \\ A & S \end{bmatrix}$$

The Bulletin of the International Linear Algebra Society
Serving the International Linear Algebra Community

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Senior Associate Editor: Beverly Ann COX (Auburn University)

ILAS President-Secretary Annual Report: June 1994

1. The following have been elected for the term March 1, 1994 to February 29, 1996:

> *President:* Hans SCHNEIDER (University of Wisconsin–Madison)
>
> *Treasurer:* James R. WEAVER (University of West Florida, Pensacola)
>
> *Board of Directors:*
>
> Richard A. BRUALDI (University of Wisconsin–Madison)
>
> Thomas J. LAFFEY (University College of Dublin).

2. A committee consisting of Richard A. Brualdi and James R. Weaver (chair) has been appointed by the President to examine the ILAS bylaws in light of our past experience, and to consider recommendations for revision. As with other committees, the President is an *ex officio* member of this committee. The proposed changes are to be discussed at the next meeting of the ILAS Board of Directors and will probably be presented at the ILAS Business Meeting in Rotterdam (August 15-19, 1994).

3. Daniel Szyld has been appointed to the ILAS Committee on the Privatization of the Internet.

4. ILAS maintains an electronic news service ILAS-NET edited by Danny Hershkowitz (Technion, Haifa). 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. As of June 5, 1994, we have circulated 394 ILAS-NET announcements. ILAS-NET currently has 551 subscribers.

5. Since May 27, 1992, the ILAS Information Center (IIC) has had 1202 information requests (not counting FTP operations).

6. Future ILAS meetings:

(a) August 15-19, 1994: Rotterdam, The Netherlands. *Organizer:* Harm Bart (Erasmus Univ., Rotterdam).

(b) August 16-19, 1995: Atlanta, Georgia.
Organizers: Frank J. Hall (Georgia State Univ., Atlanta) & Paul M. Van Dooren (Univ. Illinois, Urbana).

(c) August 14-17, 1996: Chemnitz, Germany.
Organizing Committee: Bart L. R. De Moor (Univ. Leuven), Ludwig Elsner (Universität Bielefeld), Thomas J. Laffey (Univ. College of Dublin), Volker L. Mehrmann (Chair, Technische Universität Chemnitz-Zwickau), G. Michler (Universität Essen), Michael Neumann (Univ. Connecticut, Storrs), Graciano N. de Oliveira (Univ. Coimbra), Hans Schneider (Univ. Wisconsin–Madison) & Frank Uhlig (Auburn Univ.).

Tentative:

(d) May 1997: Winnipeg, Manitoba. Workshop on Linear Algebra in Engineering Problems.
Organizers: Peter Lancaster (University of Calgary) & P. N. Shivakumar (Univ. Manitoba, Winnipeg).

(e) May 1998: Madison, Wisconsin.
Organizer: Richard A. Brualdi (University of Wisconsin–Madison).

ILAS Treasurer's Report: March 1, 1993 – February 28, 1994
by James R. Weaver, University of West Florida

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Balance on hand March 1, 1993
      Certificate of Deposits (CD)    11,000.00
      Checking Account               18,472.06              29,472.06

*************************************************************************
Checking Account Balance on March 1, 1993                    18,472.06

March 1993
      Income:
            Dues                          498.00
            Interest (First Union)         25.47     523.47
      Expenses:
            Supplies for ILAS Conf.       690.63
            Speakers for ILAS Conf.     2,888.00
            Registration, Room, & Food    914.23
            Conf. Workers                 661.22
            Sec. of State                  70.00   5,224.08    (4,700.61)

April 1993
      Income:
            Dues                          762.00
            T-Shirts                      290.00
            Interest on CD (HS)            26.85
            Interest on CD (FU)            8.63
            ILAS Photo                    174.00
            Interest (First Union)         21.08
            Contribution
              Regular                      57.00
              Conference Fund              50.00
              H. Schneider Prize           25.00   1,414.56
      Expenses:
            Postage(Photo & Membership)    62.27      62.27     1,352.29

May 1993
      Income:
            Interest (First Union)         20.03      20.03
      Expenses:
            Membership information(SIAM)   56.71      56.71      (36.68)

June 1993
      Income:
            Dues                          144.00
            Interest on CD (HS)            89.17
            Interest (First Union)         28.18
            CD from FNB (HS)           10,000.00
            Contributions
              Regular                       2.00
              H. Schneider Prize          500.00
              Conference Fund              30.00  10,793.35
      Expenses:
            Postage (Vanguard Forms)       16.45
            Conf. Expenses (UWF)          601.26     617.71    10,175.64
```

July 1993

Income:

Interest (First Union)	35.10	35.10

Expenses:

Supplies (Waller Bros.)	66.18		
Vanguard(72% HS & 28% OT/JT)	7,000.00		
Auburn (Newsletter)	690.57		
Postage (Sending Photos)	9.95		
Xeroxing	26.54	7,793.24	(7,758.14)

August 1993

Income:

Dues	480.00	
Interest (First Union)	26.79	
Interest (F. Uhlig Ed.)	8.82	
Contributions		
H. Schneider Prize	62.00	
F. Uhlig Ed. Fund	4.00	
Regular	119.00	
OTT/JT Lec. Fund	100.00	800.61

Expenses:

Shipping Poste (Dues Notice)	143.34		
Postmaster (Stamps)	69.60	212.94	587.67

September 1993

Income:

Dues	696.00	
Interest (First Union)	25.90	
Interest (F. Uhlig Ed. Fund)	10.84	
Contributions		
H. Schneider Prize	424.00	
F. Uhlig Ed. Fund	374.00	
Regular	418.60	1,949.34

Expenses:	00.00	00.00	1,949.34

October 1993

Income:

Dues	384.00	
Interest (First Union)	20.83	
Contribution		
H. Schneider Prize	18.00	
Regular	73.00	495.83

Expenses:

3 CD's ($2500 at FNB)	7500.00		
Supplies (1500 envelopes)	32.09		
Xerox copies (UWF)	21.73		
Preparing Ballots	52.50		
First Union (Exchange Rate)	4.31		
The Shipping Poste	268.85	7,879.48	(7,383.65)

November 1993

Income:

Interest (First Union)	19.17	19.17

Expenses:

Xerox copies	63.78		
Postage	193.92		
Preparing mail out	60.00	317.70	(298.53)

<u>December</u> <u>1993</u>
```
Income:
        Dues                             822.00
        Interest (First Union)            18.47
        Interest (F. Uhlig Ed. Fund)      10.72
        Contributions
          H. Schneider Prize              23.00
          F. Uhlig Ed. Fund              10.00
          Regular                         46.00      930.19
Expenses:
        Shipping Poste                   135.55      135.55      794.64
```

<u>January</u> <u>1994</u>
```
Income:
        Dues                             468.00
        Interest (First Union)            20.03
        Interest on CD (HS)               76.23
        Interest on CD (OTT/JT)           29.64
        Contributions
          H. Schneider Prize             177.00
          F. Uhlig Ed. Fund             12.00
          OTT/JT Lec. Fund               52.00
          Regular                         15.00      849.90
Expenses:                                 00.00       00.00      849.90
```

<u>February</u> <u>1994</u>
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Income:
        Dues                             438.00
        Interest (First Union)            17.05
        Contribution
          Regular                         58.00      513.05
Expenses:
        Auburn (Newsletter)              691.66      691.66     (178.61)
```
****
<u>February 28, 1994</u>   13,825.32

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Account Balance
    Checking Account                  13,825.32
    Certificate of Deposit (FU)        1,000.00
    Certificate of Deposit
    (72% HS & 28% OTT/JT)              7,500.00
    Vanguard
    (72% HS & 28% OTT/JT)             7,159.94                29,485.26
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General Fund                           8,142.71
Frank Uhlig Educational Fund           1,910.81
Hans Schneider Prize                  11,809.93
Olga Taussky Todd/John Todd Fund       4,761.58
Conference Fund                        2,860.23                29,485.26
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****

James R. Weaver

Charitable Contributions Requirements

The International Linear Algebra Society (ILAS) is a tax-exempt charitable organization as described in Section 501[c] [3] of the U. S. Internal Revenue Code. In 1993 legislation was enacted in the United States, effective January 1, 1994 that included some provisions of which we should be aware. A substantiation requirement is now required. No deduction will be allowed for a contribution of $250 or more unless there is concurrent written validation from the recipient. No longer can the taxpayer rely solely on the canceled check as proof of a gift of $250 or more. The responsibility of obtaining this proof lies with the donor. Be sure to request such proof. If it is a material donation, value is the responsibility of the donor. Your Society will provide you with the appropriate proof you may need. Just ask for it. — JAMES R. WEAVER.

New and Forthcoming Publications in Linear Algebra

Owe Axelsson: *Iterative Solution Methods*

Book Review by Steven J. Leon

Iterative Solution Methods by Owe Axelsson [Cambridge University Press, xiii + 654 pp., ISBN 0-521-44524-8] deals primarily with iterative methods for solving linear systems of equations. The book is written on a level suitable for a first year graduate course. Students will find the book quite readable. The contents are self contained, the only real prerequisite is elementary linear algebra.

Chapter 1 discusses direct methods of solving linear systems. Chapters 2, 3, and 4 present the equivalent of an advanced undergraduate course in linear algebra. These chapters, together with Appendix A (Matrix Norms), provide the theoretical background necessary for the remaining nine chapters of the book. Topics covered in Chapters 2, 3, and 4 include: the theory of matrix eigenvalues, normal and H-normal matrices, positive definite matrices, Schur complements, generalized eigenvalue problems, reducible and irreducible matrices and the Perron-Frobenius theory.

Chapters 5 and 6 cover the basic iterative methods. Topics in these chapters include basic and stationary iterative methods, Chebyshev iterative method, M-matrices, convergent splittings, and SOR. Chapters 7, 8, and 9 are devoted to preconditioning methods. Chapter 10 covers estimates of eigenvalues and condition numbers for preconditioned matrices. Chapters 11, 12, and 13 are concerned with conjugate gradient and Lanczos-type methods.

Overall the book contains a wealth of material. It certainly is a valuable reference and resource book for matrix computations. It is also well suited for graduate courses on iterative methods.

The list price is $59.95; order from: Cambridge University Press, 40 West 20th Street, New York, NY 10011-4211, USA; e-mail: GEO_CAM@ACF1.NYU.EDU, FAX (1-212) 691-3239, tel. (1-800) 872-7423.

Linear Matrix Inequalities in System and Control Theory

Linear Matrix Inequalities in System and Control Theory by Stephen Boyd, Laurent El Ghaoui, Eric Feron & Venkataramanan Balakrishnan is scheduled for publication by SIAM in June 1994 as Volume 15 of the SIAM Studies in Applied Mathematics, approx 220 pages, ISBN 0-89871-334-X (hardcover).

The authors reduce a wide variety of problems from Systems and Control Theory to a handful of standard convex and quasiconvex optimization problems that involve linear matrix inequalities. These standard problems can be solved very efficiently using recently developed numerical algorithms; therefore the reduction constitutes a solution to the original problems.

Order from: SIAM, 3600 University City Science Center, Philadelphia, PA 19104-2688, USA; e-mail: SERVICE@SIAM.ORG, FAX (1-215) 386-7999, tel. (1-800) 447-SIAM or (1-215) 382-9800 (Order Code AM15). List Price $36.50, SIAM Member Price $29.20. All royalties donated to a fund to help students attend SIAM conferences.

MATLAB Primer: Fourth Edition

The Fourth Edition of the *MATLAB Primer* is scheduled for publication in mid-August 1994 from CRC Press. Features of the new edition include: New compact, reader-friendly, bound format. Features of Version 4.2 of MATLAB blended into the text. Substantial new section on the Symbolic Math Toolbox. Extensive general revision and reformatting. A fine-grained Table of Contents and detailed Index. Same character and purpose of the earlier editions: To help students and others begin to use MATLAB.

The expected price is $12.95. Order from: CRC Press, Inc., 2000 Corporate Boulevard NW, Boca Raton, FL 33431-9868, USA; FAX (1-800) 374-3401, tel. (1-800) 272-7737 or (1-407) 994-0555. The *MATLAB Primer* is no longer available as T_EX source.

Horn & Johnson *Topics* now in Paperback

The first paperback edition of *Topics in Matrix Analysis* by Roger A. Horn and Charles R. Johnson has just been published by Cambridge University Press (viii + 607 pp., ISBN 0-521-46713-6). In the preface to this new edition, the authors observe that they have "corrected all known errata in the first printing, polished the exposition of a few points, noted the resolution of several conjectures, and added some items to the notation list and index." This book was first published in 1991 in hardback and was reviewed in LAA 174:243–246, MR 92e:15003, *Image* 7:21–22.

The list price of this new paperback edition is $29.95; order from: Cambridge University Press, 40 West 20th Street, New York, NY 10011-4211, USA; e-mail: GEO_CAM@ACF1.NYU.EDU, FAX (1-212) 691-3239, tel. (1-800) 872-7423.

Numerical Linear Algebra With Applications

Numerical Linear Algebra With Applications is a new international journal published by John Wiley & Sons, Inc., and directed at researchers in numerical analysis, computer sciences and natural sciences, engineers and economists who either take part in the development of methods in Numerical Linear Algebra or use such methods in their research. The Managing Editor is Owe Axelsson, with Advisory Editors: Åke Björck, James R. Bunch and James Ortega.

Topics covered include (but are not limited to): Conjugate-gradient like and other iterative methods; Preconditioning Methods; Direct Solution Methods; Numerical Methods for Eigenproblems; Newton-like Methods for Nonlinear Equations; Parallel and Vectorizable Algorithms in Numerical Linear Algebra; Application of Methods of Numerical Linear Algebra in Science, Engineering and Economics.

The journal emphasizes mathematical rigour in presenting new methods in Numerical Linear Algebra including their analysis and applications. Where it turns out to be difficult to give full mathematical rigour to the presentation, well-chosen numerical test problems can suffice to demonstrate the usefulness of the presented method, if these are accompanied by a discussion and heuristic explanations.

The journal also emphasizes analysis of the computational and communication complexity of algorithms in Numerical Linear Algebra when implemented on different computer architectures. The journal solicits original research papers and survey articles. All papers should contain a discussion indicating in which area(s) the approach, suggested in the paper, can be used. The authors should strive at ensuring that the presented methods are easily understandable by as broad a spectrum of readers as possible.

Initial submission: Four copies of each manuscript should be sent to the Managing Editor: Professor Owe Axelsson, Faculty of Mathematics and Informatics, University of Nijmegen, Toernooiveld, NL-6525 ED Nijmegen, The Netherlands.

Free sample copy of *Numerical Linear Algebra With Applications* is available from John Wiley & Sons, Inc., 605 Third Avenue, New York, NY 10158, USA; FAX (1-212) 850-6088, tel. (1-800) 225-5945. Subscription rates are: Institutional $235.00, Personal $180.00 (Volume 1, 1994, 6 issues).

Upcoming Special Issues of LAA

Upcoming special issues of *Linear Algebra and Its Applications* (LAA) include:

Honoring Chandler Davis. Special Editors: Rajendra Bhatia, Shmuel Friedland & Peter Rosenthal.

Proceedings of the Third ILAS Conference (Pensacola, Florida, March 1993). Special Editors: Diane P. O'Leary, Leiba Rodman & Helene Shapiro.

Proceedings of the Conference "Matrices and Graphs" in Honor of John Maybee's 65th birthday (Boulder, Colorado, May 1993). Special Editors: Charles R. Johnson & J. Richard Lundgren.

Fourth Special Issue on Linear Algebra and Statistics. Special Editors: Jeffrey J. Hunter, Simo Puntanen & George P. H. Styan.

Generalized Inverses. Special Editors: R. B. Bapat, Robert E. Hartwig & Sujit Kumar Mitra.

Proceedings of the Workshop "Nonnegative Matrices, Applications and Generalizations" and the Eighth Haifa Matrix Theory Conference (Haifa, May–June, 1993). Special editors: Shmuel Friedland, D. Hershkowitz & R. Loewy.

Honoring Miroslav Fiedler and Vlastimil Ptak. Special Editors: Wayne Barrett, Angelika Bunse-Gerstner & Nicholas Young.

Proceedings of the Fourth ILAS Conference (Rotterdam, August 1994). Special Editors: Harm Bart, Ludwig Elsner & Andre Ran. Submission Deadline: November 30, 1994.

Honoring J. J. Seidel. Special Editors: Aart Blokhuis, Willem H. Haemers & Alan J. Hoffman. Submission Deadline: August 30, 1994.

Fifth Special Issue on Linear Algebra and Statistics: in Celebration of C. R. Rao's 75th Birthday. Special Editors: R. B. Bapat, George P. H. Styan & Hans Joachim Werner. Submission Deadline: November 30, 1994.

A Guide to Books on Matrices and Books on Inequalities, with Statistical and Other Applications by George P. H. Styan & Simo Puntanen. Submission Deadline: November 30, 1994.

Special issues of LAA are available to individuals at a reduced rate. For further information, please contact Yusuf Guvenc, Journals Customer Service, Elsevier Science Publishing Company, Inc., 655 Avenue of the Americas, New York, NY 10010, USA; FAX (1-212) 633-3990, tel. (1-212) 633-3955.

Reports on Linear Algebra Events Attended

Second Matrix Theory Mini-Conference
Hong Kong: December 15–16, 1993

Report by Nam-Kiu Tsing

The Second Matrix Theory Mini-Conference was held December 15--16, 1993 at The University of Hong Kong. This conference was organized by Drs. K. Y. Chan, Y. H. Au-Yeung and N. K. Tsing, and was jointly sponsored by the Mathematics Department of The University of Hong Kong and the Hong Kong Mathematics Society. The aim of this conference was to provide a forum, in particular for local mathematicians, to discuss problems in pure and applied matrix theory. More than thirty participants from local universities and colleges, and from the United States, Canada, Mainland China, and Macau attended the conference. We had four invited speakers. Each gave an interesting and inspiring one-hour talk. The speakers were:

Chi-Kwong Li (College of William and Mary): "Closed symmetric overgroups of S_n in O_n"
Russell L. Merris (California State University, Hayward):
    "Linear and multilinear algebra applied to graphs, from quadratic forms to fullerenes"
Robert C. Thompson (University of California, Santa Barbara): "The product of exponentials of matrices"
Roy Westwick (University of British Columbia, Vancouver), "Spaces of matrices of equal rank".

In addition to these feature talks there were nine half-hour contributed talks on various areas of matrix theory. The speakers of the contributed talks were: Y. H. Au-Yeung, Chi-Fai Chan, Ji-Cheng Chen, Che-Man Cheng, Daniel W. C. Ho, A. Y. T. Leung, Wai-Sing Loo, Tin-Yau Tam, and N. K. Tsing. We thank the participants again for making this conference a very successful one.

First Southeastern Linear Algebra Conference
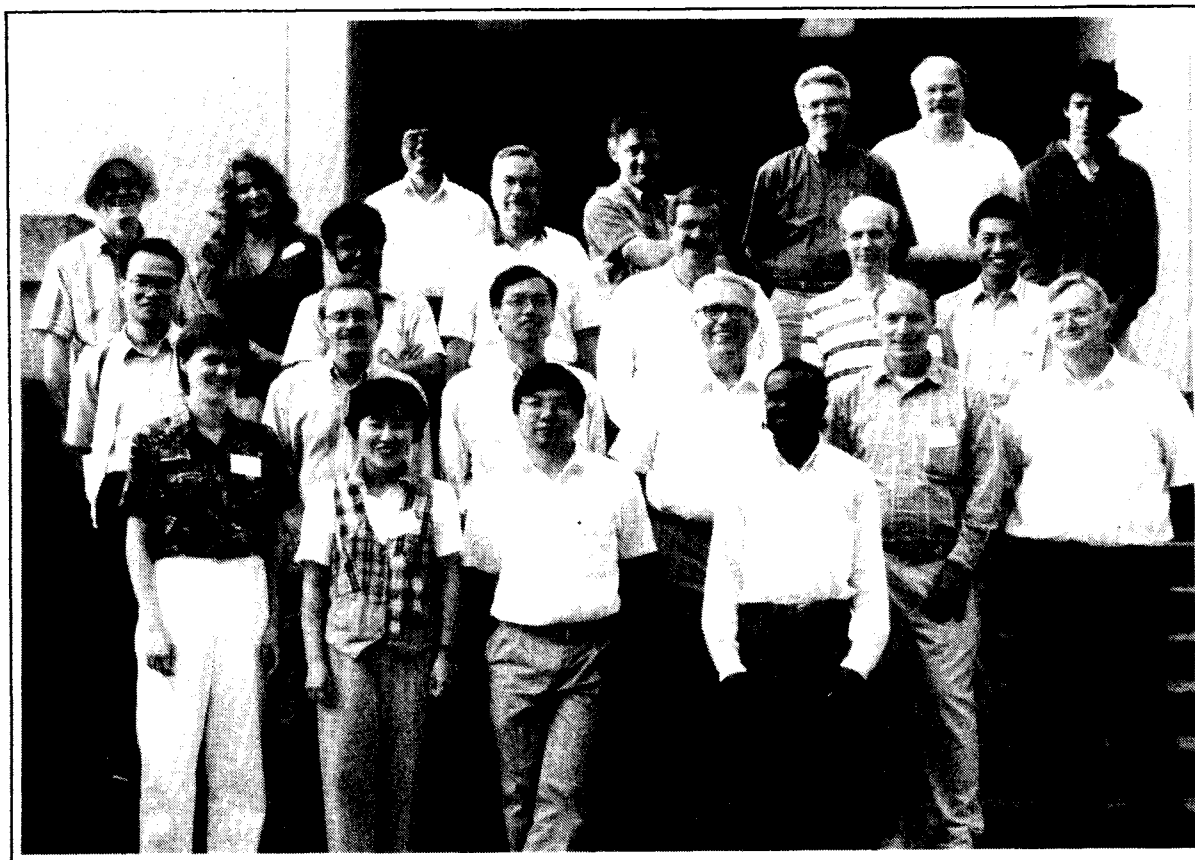## Chattanooga, Tennessee: May 27–28, 1994

Report by Ronald L. Smith

The first Southeastern Linear Algebra Conference was held May 27--28, 1994, in the University Center of the University of Tennessee at Chattanooga. Hopefully, this will become an annual/biannual event. The accommodations were excellent. Scenic Chattanooga is a popular tourist spot and many of its attractions, such as the Hunter Museum, Tennessee Aquarium, Ruby Falls, etc., were enjoyed by the participants. The co-organizers of the conference were Ronald L. Smith (University of Tennessee at Chattanooga) and Tin-Yau Tam (Auburn University). The conference was co-sponsored by ILAS and the University of Tennessee at Chattanooga.

The scientific program of the conference consisted of contributed talks on linear algebra, applied linear algebra, numerical algebra, and the teaching of linear algebra. these were given by Brenda Kroschel, Charles R. Johnson, Ronald L. Smith, Peter Nylen, Thomas L. Markham, Wasin So, James R. Weaver, George Poole, Alexandre Fedoseyev, Larry Neal, Kuiyuan Li, Frank Uhlig, Carolyn Eschenbach, Frank J. Hall, Zhongshan Li, Peter M. Gibson, Chi-Kwong Li, A. A. Ebiefung, and Paul Binding.

Indications are that the conference was a great success. The aim of the conference, to bring together southeastern linear algebraists, was achieved. The number and breadth of the contributed talks was truly impressive. Most importantly, the attendees seemed to genuinely enjoy themselves as evidenced by the lively attendance at both talks and various social gatherings. In the photo below, fron left to right, are: back row, Frank Uhlig, Carolyn Eschenbach, x_1, Charlie Johnson, x_2, x_3, Peter Nylen; second row from back x_4, Peter Gibson, x_5, Paul Binding, Jason Zhang; second row from front Chi-Kwong Li, Chris Hill, Tin Yau Tam, Jim Weaver, Frank Hall, Ron Smith; front row x_6, In'sook Ma, Wa-sin So, and A. A. Ebiefung. The Editors of *Image* will be very pleased to learn the identities of x_1, x_2, ..., x_6.

Workshop on Matrices in Statistics
Tartu, Estonia: May 28, 1994

Report by George P. H. Styan

A Satellite Workshop on Matrices in Statistics was held in the Matemaatilise Statistika Instituut, Tartu Ülikool (Dept. of Mathematical Statistics, University of Tartu) in Tartu, Estonia, on Saturday May 28, 1994, in conjunction with the 5th Tartu Conference on Multivariate Statistics, which was held in the Puhkekodu in Pühajärve, Estonia, May 23–26, 1994; the proceedings will be published by TEV-VSP (Vilnius-Utrecht-Tokyo). About 40 people stayed on for the Workshop after the main Conference (a bus tour of southern Estonia was the principal activity on Friday, May 27).

Talks were presented by John S. Chipman (Minnesota), Richard W. Farebrother (Manchester), Yasunori Fujikoshi (Hiroshima), Ene Käärik (Tartu), Otto Karma (Tartu), Heinz Neudecker (Amsterdam), Simo Puntanen (Tampere), Jon Stene (Copenhagen), Dietrich von Rosen (Uppsala), Hans Joachim Werner (Bonn), and Cemil Yapar (Trabzon).

All the various local and organizing arrangements were excellent: very many thanks to Ene-Margit Tiit, as well as to Tônu Kollo, Kalev Pärna and Imbi Traat.

In the photo are (left to right): George Styan (McGill), Hans Joachim Werner (Bonn), Eric Iksoon Im (Hawaii), Heinz Neudecker (Amsterdam) and Shuangzhe Liu (Amsterdam); Michael Greenacre (Barcelona) and Carles Cuadras (Barcelona) are in the background (top right-hand corner).

Fifth SIAM Conference on Applied Linear Algebra
Snowbird, Utah: June 15–18, 1994

Report by Steven J. Leon & George P. H. Styan

The Fifth SIAM Conference on Applied Linear Algebra was held at the Snowbird Ski and Summer Resort in Snowbird, Utah, June 15–18, 1994. The conference had an experimental format in that the Contributed Paper sessions and the Poster sessions were organized as group discussion sessions rather than individual talks. Papers (limited to 5 pages) were available ahead of time for all to read in a published proceedings, edited by John G. Lewis and very attractively produced [x + 578 pp., ISBN 0-89871-336-6 (softcover); list price $74.50, SIAM Member price $59.60]. Unfortunately these proceedings do not include the invited papers.

Overall it seemed like the new format was highly successful. It certainly provided for much more interaction among participants. One major improvement over previous conferences in this series was the organization of the sessions. There were fewer sessions and the organizers succeeded valiantly in avoiding the massive parallelism so prevalent in the past. Attendees were surveyed ahead of time as to their preferences in sessions. During the day there were never more than two sessions at the same time. These sessions were different enough so that it was always a clear cut choice as to which to attend. In the evenings there were generally 3 or 4 common interest sessions being held at the same time. Additionally there were 12 Minisymposia each with four half-hour talks and seven invited presentations (45 minutes each).

There were many excellent talks. We were particularly impressed with the invited presentations which provided concise surveys of the state of the art in many areas of research. The invited presentations were:

James W. Demmel (University of California, Berkeley): "Fast Parallel Algorithms for Eigenproblems"

Persi Diaconis (Harvard University): "Geometry and Eigenvalues"

Israel C. Gohberg (Tel Aviv University): "Control Theory and Linear Algebra"

Anne Greenbaum (Courant Institute): "Recent Advances in Iterative Methods for Solving Linear Systems"

Charles R. Johnson (College of William & Mary):
     "Nonnegative Matrices: Can the Next Century Top This One?"

Robert S. Schreiber (RIACS): "Parallel Matrix Computations"

Leslie Trotter (Cornell University): "Linear Algebraic Duality for Discrete Optimization"

Another highlight of the conference was the awarding of the SIAM Activity Group Linear Algebra Prize for the best paper over a three-year period. There were 10 nominations altogether of which 8 were ruled to be eligible. Two papers were selected as being equally deserving of the prize. The winning authors were Anne Greenbaum & Z. Strakos and Roland Freund & Noel Nachtigal. Our congratulations to the winners.

ATLAST Developers Workshop
San Diego, California: June 21–25, 1994

Report by Steven J. Leon

An ATLAST Developers Workshop was held June 21–25, 1994, at the University of California, San Diego. The purpose of this invited workshop was to bring together a group of 28 experts to develop linear algebra computer exercises for inclusion in the ATLAST database. The leader of the workshop was David Hill (Temple University). Jane Day (San Jose State University), Eugene Herman (Grinnell College), Steven J. Leon (University of Massachusetts, Dartmouth), and Kermit Sigmon (University of Florida, Gainesville) served as workshop presenters and group leaders. Additionally Richard Faulkenberry (University of Massachusetts, Dartmouth) and Andre Weideman (Oregon State University) assisted in running and coordinating the workshop. Al Shenk (University of California, San Diego) was the local coordinator.

Workshop participants broke up into small groups to design exercises on each of the major topics covered in undergraduate linear algebra courses. Each group's exercises were evaluated by individuals from other groups and then revised accordingly. Altogether there were ten groups. Each group designed a number of outstanding and original computer exercises. Most of the exercises developed will eventually be available electronically from the Mathematics Archives at the University of Tennessee, Knoxville. Many of the exercises developed will be included in the book *ATLAST Computer Exercises for Linear Algebra*, which is being edited by Steven J. Leon, Eugene Herman, and Richard Faulkenberry.

Although it was a very intensive workshop, participants were given Thursday afternoon and evening off to see the sights in the San Diego area. Participants again broke up into groups, but this time to visit such well known sights as the San Diego Zoo, Tory Pines Park in La Jolla (a few miles from the university), Mount Palomar, and one group drove down to Tijuana, Mexico. Many had dinner in San Diego's Old Town on Thursday evening. The organizers would like to thank the University of California, San Diego, for hosting the workshop. We all enjoyed the beautiful campus surroundings.

The ATLAST workshops are sponsored by an NSF Faculty Enhancement grant; ILAS is also a sponsor. Indeed, it was an ILAS seed grant of $400 that helped to get the ATLAST Project started. ATLAST expects to offer six more workshops in 1995 and 1996. The first five of these will be basic workshops to train instructors on the use of software in linear algebra classes. The last workshop will be another invited Developers workshop in 1996.

Selected Upcoming Linear Algebra Events

Mini-Courses: Applications of Operator Theory

Waterloo, Ontario: September 24–29, 1994

As a prelude to the International Conference on Applications of Operator Theory (to be held October 2-6, 1994 in Winnipeg, Manitoba: cf. page 14), its International Program Committee has developed a program of mini-courses to be held September 24–29, 1994, at the Fields Institute, Waterloo, Ontario, Canada. The mini-courses are:

Control of Uncertain Systems. Instructor: M. A. Dahleh (MIT).

State-Space Theory of Rational Matrix Functions and Input-Output Operators.
Instructor: M. A. Kaashoek (Amsterdam).

Infinite Matrices and Projection Methods. Instructor: A. Boettcher (Chemnitz).

Operators on Indefinite Inner Product Spaces. Instructor: J. L. Rovnyak (Virginia).

Operator Theory and Ordinary Differential Operators.
Instructor: A. Dijksma (Groningen) & H. Langer (Vienna).

Those wishing to attend one or more of these mini-courses must apply to The Fields Institute which will manage local arrangements and finances. Financial support may be available to participants, and interested individuals at affiliated universities are especially encouraged to apply. The mini-course program will be funded by The Fields Institute.

For application to these mini-courses contact: Course Registration, The Fields Institute, 185 Columbia Street West, Waterloo, Ontario, Canada N2S 5Z5; COURSE@FIELDS.UWATERLOO.CA.

International Workshop: Total Positivity and Its Applications

Jaca, Spain: September 26–30, 1994

Organized by the Departamento de Matematica Aplicada, University of Zaragoza, Spain, this meeting will concentrate on the latest developments in the theory of Total Positivity, and its applications to different fields including Probability and Statistics, Combinatorics, Integral and Differential Equations, Geometric Modeling, Matrix Theory, Approximation Theory, Complex Analysis, Numerical Analysis, and Wavelet Analysis.

The meeting will take place in the Residence of the University of Zaragoza, located in the picturesque town of Jaca, in the foothills of the Spanish Pyrenees. The Residence has 66 rooms, all with private bathrooms, which can be used either as single or double rooms. Meals will be provided at the Residence. The price is 4500 pesetas (about $33 at the present exchange rate) per day, full board, in a single room and 3500 pesetas (about $26) per person per day in a double (shared) room. Alternatively, reservations can be made in the Gran Hotel (3 stars) at 4500 psts + 6% tax for a single room, 3600 psts + 6% per person in a double (shared) room. These prices do not include meals, but the Gran Hotel is quite close to the Residence and those participants who decide to stay at the Gran Hotel can take their meals in the Residence. The cost for the meals in the Residence is 1600 psts per day. The Registration fee is 18000 psts (about $132).

The Organizing Committee consists of Mariano Gasca (University of Zaragoza), Charles A. Micchelli (IBM T. J. Watson Research Center), Allan Pinkus (Technion, Haifa) & Timothy N. T. Goodman (University of Dundee). Invited Speakers include B. Bojanov (Sofia), F. Brenti (Perugia), J. Carnicer (Zaragoza), J. Garloff

(Konstanz), M. Gasca (Zaragoza), T. N. T. Goodman (Dundee), B. Heiligers (Augsburg), R-Q. Jia (Edmonton), S. Karlin (Stanford), C. A. Micchelli (New York), K. Morken (Oslo), J. M. Peña (Zaragoza), A. Pinkus (Haifa) & R. Zalik (Auburn).

Those interested in participating, contributing or receiving future announcements should contact: IWTPA, Depto. Matematica Aplicada, Facultad de Ciencias, Universidad de Zaragoza, Edificio de Matematicas, E-50009 Zaragoza, Spain; IWTPA@CC.UNIZAR.ES or GASCA@CC.UNIZAR.ES, FAX (34-76) 356244, tel. (34-76) 356617.

International Conference: Applications of Operator Theory

Winnipeg, Manitoba: October 2–6, 1994

An International Conference on Applications of Operator Theory will be held October 2-6, 1994 at the Delta Hotel, Winnipeg, Manitoba, Canada. The conference is being organized by the Institute of Industrial Mathematical Sciences (IIMS), University of Manitoba.

Conference Objectives. Linear operators can be used to describe a great variety of physical phenomena. They may take several different forms such as matrix, integral, or differential operators. A primary purpose of operator theory is to provide a coherent body of knowledge which can explain phenomena common to the enormous variety of problems in which linear operators play a part. The theory is a vital part of "functional analysis" whose methods and techniques are one of the major advances of twentieth century mathematics, and now play a pervasive role in the modelling of phenomena in probability, imaging, signal processing, systems theory, etc., as well as the more traditional areas of theoretical physics and mechanics.

The purpose of this meeting is to provide an opportunity for the presentation and discussion of recent developments in pure and applied research involving the use and development of operator theory. This conference will provide a forum in which mathematicians, engineers, theoretical physicists, and other scientists can exchange ideas and experience. To assist in preparing a coherent program six areas of application of operator theory will be emphasized (see below). The research conference is to be held in an environment conducive to informal discussion and interaction among all participants.

Six topics will be emphasized. The topics and invited speakers follow (an asterisk indicates unconfirmed):

Optimal and Robust Control. Invited Speakers: T. Chen (Calgary), R. F. Curtain (Groningen), M. Dahleh (MIT), A. B. Rantzer (Uppsala) & J. Owen (McGill).

Hankel Operators and Balanced Realizations. Invited Speakers: K. Glover (Cambridge), V. M. Adamjan (Odessa), D. Z. Arov (Odessa), R. Ober (Dallas), V. V. Peller (Hawaii), A. V. Semyonov* (Moscow) & N. J. Young (Lancaster).

Interpolation of Rational Matrix Functions. Invited Speakers: J. A. Ball (Virginia), H. Dym (Weizman Institute), M. A. Kaashoek (Amsterdam), A. A. Nudelman (Odessa), A. H. Sayed (Stanford) & A. Tannenbaum (Minnesota).

Infinite Matrices and Projection Methods. Invited Speakers: I. Gohberg (Tel Aviv), E. Basor (San Luis Obispo), R. V. Duduchava (Tbilisi), N. Krupnik (Bar Ilan), H. Landau (Murray Hill), B. Silbermann (Chemnitz) & H. Widom (Santa Cruz).

Schrödinger Operators. Invited Speakers: B. Simon (Pasadena), M. S. Birman* (St. Petersburg), J. Derezhinski* (Warsaw), E. Gesztesy (Missouri), W. Hunziker (Zürich), S. A. Molchanov (North Carolina), I. M. Sigal (Toronto) & G. M. Zhislin* (Novgorod).

Indefinite Inner Product Spaces and their Applications. Invited Speakers: T. Kailath (Stanford), T. J. Azizov* (Voronezh), A. Gheondea* (Bucharest), B. Najman* (Zagreb), H. Langer (Vienna), A. Markus (Beer Sheva), R. Menniken (Regensburg), A. Mingarelli (Carleton), L. Rodman (William & Mary) & A. Shkalikov (Moscow).

The Program Committee for the conference consists of Peter Lancaster (Chair, Univ. Calgary), M. Dahleh (MIT), P. A. Fillmore (Dalhousie), B. A. Francis (Toronto), F. Ghahramani (Manitoba), K. Glover (Cambridge), I. Gohberg (Tel Aviv), T. Kailath (Stanford), H. Langer (Vienna), P. N. Shivakumar (Manitoba), A. Shkalikov (Moscow), B. Simon (Pasadena) & H. Widom (Santa Cruz).

The Conference Banquet will be at 6:30 p.m. on Wednesday, October 5, 1994. At the Banquet, Professor Peter Lancaster will be honored for his contributions to Mathematics in Canada.

All inquiries regarding this meeting, should be addressed to: P. N. Shivakumar, Director: Institute of Industrial Mathematical Sciences, University of Manitoba, Winnipeg, Manitoba, Canada R3T 2N2.

As a prelude to this Conference on Applications of Operator Theory, its International Program Committee has developed a program (cf. page 13) of mini-courses to be held September 24–29, 1994, at the Fields Institute, Waterloo, Ontario, Canada.

Southern California Matrix Theory Conference

Salt Lake City, Utah: November 12, 1994

The 1994 Southern California Matrix Theory Conference, the oldest established floating matrix theory meeting in the world, will be held in Salt Lake City, Utah, on the beautiful campus of the University of Utah on Saturday, November 12, 1994. The Organizing Committee is chaired by Roger A. Horn, University of Utah. Valley and mountain vistas abound; the scenic environment is a stunning stimulant to mathematical discourse and discovery.

The scientific program will be conducted all day Saturday, November 12, at the Mathematics Department, and will be followed by a dinner for all speakers and participants at the Horn home near campus. Friday, November 11, 1994 is Veteran's Day in the USA; participants may wish to use the long weekend to enjoy Utah's many wonders.

The organizing committee is: Wayne Barrett, Brigham Young University (WAYNE@MATH.BYU.EDU), LeRoy Beasley (Utah State University, Logan: LBEASLEY@USU.EDU), Roger A. Horn (Chair, Univ. Utah: RHORN@MATH.UTAH.EDU) & Kent Kidman (Weber State University, Ogden: KKIDMAN@CC.WEBER.EDU).

In keeping with the long traditions of this conference, there will be no registration fees, no expenses or honoraria will be paid, no proceedings will be produced, and the dinner is free. Competition between regional and national airlines has made $59 airfares available between Salt Lake City and many western cities. Please contact Roger Horn by email if you would like to attend or speak.

MAA Session on Teaching Linear Algebra at Joint Meetings

San Francisco, California: January 4–7, 1995

The Mathematical Association of America (MAA) and the American Mathematical Society (AMS) will hold their Joint Meetings in San Francisco from Wednesday, January 4 through Saturday, January 7, 1995. The MAA is offering a contributed paper session on Innovations in Teaching Linear Algebra. The session will meet Wednesday afternoon, Thursday evening, and Friday afternoon.

The teaching of linear algebra is undergoing substantial change. This session invites papers on personal experiences with innovation in teaching linear algebra including: (1) the creative use of computer algebra systems, supercalculators, or computer software; (2) experience with the NSF-funded ATLAST workshops; (3) experiences with the core curriculum recommended by the Linear Algebra Curriculum Study Group (LACSG);

"gems" of exposition in linear algebra; and (5) other innovative teaching or curriculum initiatives in undergraduate linear algebra.

The session is being organized by Don LaTorre, Steven J. Leon and David C. Lay. If you wish to contribute a paper, send a one page summary of your talk to: Donald R. LaTorre, Dept. of Mathematical Sciences, Clemson University, Clemson, SC 29634--1907, USA; LATORRD@CLEMSON.CLEMSON.EDU, FAX (1-803) 656--5230, tel. (1-803) 656-3437. The summary must reach Don by Friday, September 2, 1994, in order for your paper to be considered. Receipt of all one-page summaries will be acknowledged and if your paper is accepted you will be sent a standard MAA abstract form to fill out.

Least Squares Conference to Honour Åke Björck

Linköping, Sweden: January 9–10, 1995

In celebration of Åke Björck's 60th birthday a conference on Least Squares: Theory, Algorithms and Applications will be held at Linköping University, January 9--10, 1995. The aim of this conference is to celebrate the many contributions of Åke Björck to numerical analysis. This is best done by bringing together scientists working in the field of numerical linear algebra to discuss the latest developments concerning least squares methods. It is an interesting coincidence that in 1995 it will be 200 years since the least squares method was first used (according to Gauss in his dispute with Legendre). A conference dinner and birthday party will be held on the evening of Monday, January 9, 1995. On January 11--13, 1995, a symposium will be held in Stockholm to celebrate Germund Dahlquist's 70th birthday (for information, contact Gustaf Soderlind: GUSTAF.SODERLIND@DNA.LTH.SE.

The following speakers have agreed to give a talk: Iain Duff (Rutherford Laboratory & CERFACS), Gene Golub (Stanford) Chris Paige (McGill), Haesun Park, (Minnesota), Mike Saunders (Stanford), G. W. Stewart (Maryland), Charles Van Loan (Cornell) & Jim Varah (British Columbia). The Organizing Committee comprises: Lars Eldén & Tommy Elfving (Linköping), Gene Golub (Stanford), Bo Kågstrom (Umeå) & Axel Ruhe (Gothenburg).

For further information about this conference please send a message to Lars at the address below. There will be a number of contributed 20-minute papers. Abstracts for contributed papers should be submitted by September 15, 1994, to Lars Eldén, Dept. of Mathematics, Linköping University, S-581 83 Linköping, Sweden; LAELD@MATH.LIU.SE, FAX (46-13) 10.07.46, tel. (46-13) 28.21.83.

International Workshop: Numerical Solution of Markov Chains

Raleigh, North Carolina: January 16–18, 1995

Organized in cooperation with the SIAM Activity Group on Linear Algebra, an International Workshop on the Numerical Solution of Markov Chains will be held at North Carolina State University (NCSU), Raleigh, January 16--18, 1995. The aims of this workshop are twofold. To foster cooperation among researchers and practitioners working on diverse aspects of the numerical solution of Markov chains; and to provide an opportunity for researchers to present their latest results. The collection of presentations intends to be an authoritative overview of the field, including its developments, current status and projections for future directions. With this in mind, the program will consist of both invited and contributed papers. The workshop proceedings will be published.

Workshop topics include: Applications, Matrix Generation Techniques, Computation of Stationary Probability Vectors, Computation of Transient Solutions, Approximations, Sensitivity Analysis, Stochastic Petri Nets, Stochastic Automata Networks, Markov Reward Models, Infinite Markov Chains, Parallel and Distributed Implementations, and Software Demonstrations.

Participants will include: G. Fishman (Univ. North Carolina, Chapel Hill), G. H. Golub (Stanford University), W. K. Grassmann (Univ. Saskatchewan), U. Krieger (Deutsche Bundespost Telekom), G. Latouche (Univ. Libre de Bruxelles), D. Mitra (AT&T, Bell Labs.), R. Muntz (UCLA), M. F. Neuts (Univ. Arizona), B. Plateau (IMAG–France), Y. Saad, Univ. Minnesota), P. Schweitzer (Univ. Rochester), P. Semal (Philips Research Labs.), G. W. Stewart (Univ. Maryland) & W. Whitt (AT&T Bell Labs.).

The Program Committee comprises: William J. Stewart (Chair, NCSU), Ilse Ipsen (NCSU), Carl D. Meyer (NCSU), Erol Gelenbe (Duke), Kishor Trivedi (Duke), Sandy Stidham (Univ. North Carolina, Chapel Hill) & Robert J. Plemmons (Wake Forest). For further information contact: William J. Stewart, Dept. of Computer Science, North Carolina State University, Box 8206, Raleigh, NC 27695-8206, USA; FAX (1-919) 515-7896, tel. (1-919) 515-7824, BILLY@CSC.NCSU.EDU.

International Symposium: Iterative Methods in Linear Algebra

Blagoevgrad, Bulgaria: June 18–21, 1995

Organized by The International Association for Mathematics and Computers in Simulation (IMACS) and the Bulgarian Academy of Sciences (BAS), the Second IMACS International Symposium on Iterative Methods in Linear Algebra will be held in Blagoevgrad, Bulgaria, June 18–21, 1995. The International Program Committee comprises: Owe Axelsson (Nijmegen), Randolph Bank (San Diego), Robert Beauwens (Brussels), Tony Chan (Los Angeles), Françoise Chatelin (Paris), Ivan T. Dimov (Sofia), Stefka Dimova (Sofia), Jack J. Dongarra (Knoxville), Iain Duff (Rutherford Appleton Lab.), Richard E. Ewing (College Station), Roland Freund (Murray Hill), Krassimir Georgiev (Sofia), Apostolos Hadjidimos (Purdue), Sven Hammarling (NAG, Oxford), Piet Hemker (Amsterdam), Oleg Iliev (Sofia), Michail Kaschiev (Sofia), David Kincaid (Austin, Texas), Yousef Saad (Minneapolis), Harry Yserentant (Tübingen), Henk van der Vorst (Utrecht), Junping Wang (Laramie), Ragnar Winther (Oslo), and David H. Wood (Delaware).

The topics for this Symposium are: Matrix Analysis (convergence acceleration, preconditioning techniques, methods for nonsymmetric, indefinite, singular and overdetermined systems, sparse eigenproblems); Applications to PDEs (multigrid methods, domain decomposition methods, spectral methods), systems theory, least square problems, parallel matrix computation; Software Development (sparse linear systems, sparse eigenproblems, application oriented software; on sequential machines; on parallel machines).

Special Sessions will include: "The influence of high-nonnormality on the reliability of iterative methods in Computational Linear Algebra" by Françoise Chatelin (Université de Paris–IX) and Valerie Fraysee (CERFACS), "Krilov-subspace methods for nonsymmetric and indefinite linear systems" by Roland Freund (AT&T Bell Labs., Murray Hill), "Iterative Monte Carlo methods" by Ivan T. Dimov (CICT at BAS, Sofia), "Robust Preconditioners" or "Industrial Problems" by Yousef Saad (University of Minnesota, Minneapolis).

The deadline for submission of abstracts (one page stating clearly the originality and importance of the results): October 1994. Notification of acceptance of the papers on the basis of the submitted abstracts mailed by January 1995. Deadline for submission of full papers March 1995. Notification of acceptance of full papers mailed by April 1995. For more information contact the Local Organizing Committee: Svetozar Magenov & Panayot Vassilevski, CICT at Bulgarian Academy of Sciences, "Acad. G. Bontchev" Street, Block 25A, BG-1113 Sofia, Bulgaria; IMACS95@BGEARN.BITNET or PANAYOT@BGEARN.BITNET.

IMA Conference on Linear Algebra and Its Applications

Manchester, England: July 10-12, 1995

The Institute of Mathematics & Its Applications in conjunction with the Manchester Centre for Computational Mathematics is sponsoring a conference on Linear Algebra and Its Applications, Monday 10th to Wednesday 12th July, 1995 at the University of Manchester. The conference aims to cover the latest developments in numerical linear algebra, matrix theory and applications of linear algebra. It immediately follows ICIAM 95 in Hamburg. The conference will consist of two and a half days of invited and contributed talks and posters, with an excursion on the Tuesday afternoon, 11th July 1995, and a conference dinner on the Tuesday evening.

The Organizing Committee for the conference consists of N. J. Higham (Chair, Univ. Manchester), I. S. Duff (Rutherford Appleton Laboratory & CERFACS), R. Fletcher (Univ. Dundee), T. L. Freeman (Univ. Manchester), S. J. Hammarling (NAG Ltd., Oxford) & N. K. Nichols (Univ. Reading).

The following is a list of invited speakers with provisional titles of their talks:

R. A. Brualdi (Univ. Wisconsin–Madison): Combinatoric matrix theory.

N. I. M. Gould (Rutherford Appleton Lab.): Linear algebra in optimization.

P. C. Hansen (Technical Univ. Denmark): Regularization of large-scale discrete ill-posed problems.

R. A. Horn (Univ. Utah): Hadamard products, unitarily invariant norms, and perturbation bounds for the polar decomposition.

N. Mackey (SUNY, Buffalo): Convergence of Jacobi-like methods for the symmetric eigenproblem.

R. Mathias (College of William & Mary): Accurate eigenvalue computations.

G. Strang (MIT): Teaching of linear algebra.

J. Wathen (Bristol): Iterative solution of large, sparse linear systems arising in PDEs.

M. H. Wright (AT&T Bell Labs.): Linear algebra in optimization.

Additional invited speakers include: J. W. Demmel (Berkeley), G. H. Golub (Stanford), H. van der Vorst (Utrecht), P. Van Dooren (Urbana), Z. Bai (Kentucky), A. Edelman (MIT), D. J. Higham (Dundee), H. Park (Minnesota), D. Ruiz (CERFACS) & B. Smith (UCLA).

Contributed Papers and Posters. In addition to invited talks, there will be poster sessions and 20 minute contributed talks. The deadline for receipt of abstracts is 31 December 1994. Contributed speakers are required to register for the conference and therefore must pay the conference fee, and, if required, the residential fee.

There are two ways to submit an abstract:

(1) Obtain a reply form from the IMA (address below), and return it, with the abstract, to the IMA.

(2) Submit an abstract by email to LAA95@MA.MAN.AC.UK. You need to send a completed ASCII version of the reply form, an abstract prepared in LaTeX using the style file IMA-ABST.STY. You will need to download by anonymous ftp from VTX.MA.MAN.AC.UK or CHOLESKY.MA.MAN.AC.UK (IP numbers 130.88.16.2, 130.88.16.9) the files

PUB/LAA95/REPLY.TXT (Electronic reply form)

PUB/LAA95/IMA-ABST.STY (LaTeX style file for abstract)

PUB/LAA95/IMA-ABST.TEX (Example abstract showing required format)

PUB/LAA95/MANCHESTER.TEX (General information on Manchester).

Address for correspondence: Ms Pamela Irving, The Conference Officer, The Institute of Mathematics and Its Applications (IMA), Catherine Richards House, 16 Nelson Street, Southend-on-Sea, Essex SS1 1EF, England, UK; FAX (44-702) 354111, tel. (44-702) 354020. [Please note that the IMA is not yet on e-mail.]

International Calendar of Events in Linear Algebra and Related Topics

The ❀ identifies ILAS meetings. For further details please contact the address in square brackets. FAX & telephone numbers begin with the country-city codes in parentheses; e-mail addresses appear in small caps. Please send additions/corrections by e-mail to MT56@MUSICA.MCGILL.CA or by FAX to (1-514) 398-3899.

1994

❀ **August 15–19: Rotterdam, The Netherlands.** International Linear Algebra Society (ILAS): 4th Conference. Erasmus Universiteit. [H Bart, Econometrisch Instituut, Erasmus Universiteit, Postbus 1738, NL-3000 DR Rotterdam; FAX (31-10) 452-7746, BART@WIS.FEW.EUR.NL.]

August 22–25: Leuven, Belgium. Singular Value Decomposition & Signal Processing: 3rd International Workshop. [L de Lathauwer, Dept. of Electrical Engineering, ESAT/SISTA, Katholieke Universiteit, K. Mercierlaan 94, B-3001 Heverlee.]

September 21–23: Vitoria/Gasteiz, Spain. Matrix Analysis & Applications Conference. Facultad de Farmacia, Universidad del Pais Vasco/Euskal Herriko Unibertsitatea. [I de Hoyos, Dep. de Matemática Aplicada, Estadística e Investigación Operativa, Facultad de Farmacia, Universidad del Pais Vasco/Euskal Herriko Unibertsitatea, Apartado 340, E-01080 Vitoria/Gasteiz; MEPDEIZI@LG.EHU.ES, FAX (34-45) 130-756.]

September 24–29: Waterloo, Ontario. Mini-Courses on Applications of Operator Theory. Fields Institute. [Course Registration, Fields Institute, 185 Columbia Street West, Waterloo, Ontario N2S 5Z5; COURSE@FIELDS.UWATERLOO.CA.] *See also page 13.*

September 26–30: Jaca, Spain. Total Positivity and Its Applications: International Workshop. Universidad de Zaragoza. [IWTPA, Depto. Matematica Aplicada, Facultad de Ciencias, Edificio de Matematicas, Univ. Zaragoza, E-50009 Zaragoza; IWTPA@CC.UNIZAR.ES or GASCA@CC.UNIZAR.ES, FAX (34-76) 356244.] *See also pp. 13–14.*

October 2–6: Winnipeg, Manitoba. International Conference on Applications of Operator Theory. Delta Hotel. [PN Shivakumar, Director: Institute of Industrial Mathematical Sciences, University of Manitoba, Winnipeg, Manitoba R3T 2N2.] *See also page 14.*

October 6–7: Wuppertal, Germany. Large Systems of Equations on Parallel Computers: Numerical Aspects and Applications Workshop. [A Frommer, Fachbereich Mathematik und Institut für Angewandte Informatik, Bergische Universität-Gesamthochschule Wuppertal, Gauß-Strasse 20, D-42097 Wuppertal; Fax: (49-202) 439-2853, WORKSHOP@MATH.UNI-WUPPERTAL.DE.] *See also NA Digest, vol.94, no.23.*

October 31–November 4: Delft, The Netherlands. Orthogonality, Moment Problems & Continued Fractions: International Conference in Honour of Thomas Jan Stieltjes, Jr. (1865–1894). [Dept. of Pure Mathematics, Delft Univ. of Technology, Mekelweg 4, Room H4.11, PO Box 5031, NL-2600 Delft; TJS94@TWI.TUDELFT.NL.]

November 12: Salt Lake City, Utah. Southern California Matrix Theory Conference. University of Utah. [RA Horn, Dept. of Mathematics, University of Utah, Salt Lake City, UT 84112; FAX (1-801) 581-4148, RHORN@MATH.UTAH.EDU.) *See also page 15.*

December 12–14: Fish Camp, California. Conference on Inverse Problems. [SIAM, 3600 Univ. City Science Center, Philadelphia, PA 19104-2688; MEETINGS@SIAM.ORG, FAX (1-215) 386-7999.]

1995

January 4–7: San Francisco, California. MAA Session on Teaching Linear Algebra. Joint AMS-MAA Meetings. [DR LaTorre, Dept. of Mathematical Sciences, Clemson University, Clemson, SC 29634-1907; FAX (1-803) 656--5230, LATORRD@CLEMSON.CLEMSON.EDU.] *See also pp. 15–16.*

January 9–10: Linköping, Sweden. Least Squares: Theory, Algorithms and Applications. In Honour of Åke Björck's 60th Birthday. Linköping University. [L Eldén, Dept. of Mathematics, Linköping University, S-581 83 Linköping; LAELD@MATH.LIU.SE, FAX (46-13) 10.07.46.] *See page 16.*

January 11–13: Stockholm, Sweden. Symposium in Honour of Germund Dahlquist's 70th Birthday. [G Soderlind: GUSTAF.SODERLIND@DNA.LTH.SE.]

January 16–18: Raleigh, North Carolina. Numerical Solution of Markov Chains: 2nd International Workshop. [WJ Stewart, Dept. of Computer Science, North Carolina State University, Box 8206, Raleigh, NC 27695-8206; BILLY@CSC.NCSU.EDU, FAX (1-919) 515-7824.] *See also pp. 16–17.*

May 29–June 1: Gadong, Brunei Darussalam. International Conference on Mathematical Modelling (Physical, Biological, Engineering & Social Systems). Universiti Brunei Darussalam. [Dept. of Mathematics, Universiti Brunei Darussalam, Gadong 3186.]

June 18–21: Blagoevgrad, Bulgaria. 2nd IMACS International Symposium on Iterative Methods in Linear Algebra. [P Vassilevski, CICT at Bulgarian Academy of Sciences, "Acad. G. Bontchev" Street, Block 25A, BG-1113 Sofia; IMACS95@BGEARN.BITNET.] *See also page 17.*

June 26–30: Dundee, Scotland. 16th Dundee Conference on Numerical Analysis. University of Dundee. [DF Griffiths, Dept. of Mathematics & Computer Science, The University, Dundee DD1 4HN; NA.GRIFFITHS@NA-NET.ORNL.GOV.]

July 2–8: Oberwolfach, Germany. Algebraic and Combinatorial Methods in Multivariate Statistical Analysis. Organizers: MD Perlman & F Pukelsheim. [Geschäftsstelle, Albertstraße 24, D-79104 Freiburg im Breisgau; FAX (49-761) 27.26.89.]

July 3–7: Hamburg, Germany. 3rd International Congress on Industrial & Applied Mathematics: ICIAM95. CCH Congress Centrum. [GAMM, NWFI-Mathematik, Universität Regensburg, D-93053 Regensburg; ICIAM95@VAX1.RZ.UNI-REGENSBURG.D400.DE.]

July 10–12: Manchester, England. IMA Conference on Linear Algebra and Its Applications. University of Manchester. Organizer: N. J. Higham. [P Irving, IMA, 16 Nelson Street, Southend-on-Sea, Essex SS1 1EF, FAX (44-702) 354-111, HIGHAM@VTX.MA.MAN.AC.UK.] *See also page 18.*

❀ **August 16–19: Atlanta, Georgia.** International Linear Algebra Society (ILAS) Conference. [FJ Hall, Dept. of Mathematics & Computer Science, Georgia State University, Atlanta, GA 30303-3083; FAX (1-404) 651-2246, MATMSG@GSUVM1.BITNET.] *See also page 2.*

August 28–September 1: Dunedin, New Zealand. A. C. Aitken Centenary Conference, 3rd Pacific Statistical Congress & New Zealand Statistical Association Annual Meeting. University of Otago. [BFJ Manly, Dept. of Mathematics & Statistics, Univ. of Otago, PO Box 56, Dunedin; FAX (64-3) 479-8427, CASM@MATHS.OTAGO.AC.NZ.]

1996

❀ **August 14–17: Chemnitz, Germany.** International Linear Algebra Society (ILAS) Conference. [VL Mehrmann, Fakultät für Mathematik, Technische Universität Chemnitz-Zwickau, PSF 964, D-09009 Chemnitz; FAX (49-371) 531-2657, MEHRMANN@MATHEMATIK.TU-CHEMNITZ.DE.] *See also page 2.*

1997

❀ **May (tentative): Winnipeg, Manitoba.** International Linear Algebra Society (ILAS) Workshop with Emphasis on Linear Algebra in Engineering Problems. [P Lancaster, Dept. of Mathematics, Univ. of Calgary, Calgary, Alberta T2N 1N4; LANCASTER@ACS.UCALGARY.CA.] *See also page 2.*

1998

❀ **May (tentative): Madison, Wisconsin.** International Linear Algebra Society (ILAS) Conference. [RA Brualdi, Dept. of Mathematics, University of Wisconsin–Madison, Van Vleck Hall, 480 Lincoln Drive, Madison, WI 53706-1388; BRUALDI@MATH.WISC.EDU, FAX (1-608) 262-1402.] *See also page 2.*