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

Issue Number 15, Summer 1995: pp. 1–24.

Department of Mathematics	Electronic mail:		
Oniversity of Massachusetts-Dartmouth Old Westport Road	SLEON@UMASSD.EDU		
North Dartmouth, MA 02747-2300, USA	FAX (1-508) 999-8901		
Department of Mathematics and Statistics	Electronic mail:		
McGill University, Burnside Hall 1240	MT56@MUSICA.MCGILL.CA		
Montréal, Québec, Canada H3A 2K6	FAX (1-514) 398-3899		
ILAS President/Vice-President Annual Report: June 1995	2		
News from the ILAS Information Center-IIC			
ILAS Treasurer's Report: March 1, 1994–February 28, 1995 (J. R. Weave	er)		
In Memoriam			
Honors and Awards			
LMITOOL: An Interface for Solving LMI Problems			
New Onicers of the SIAM Activity Group on Linear Algebra			
More Books on Linear Algebra and Related Topics: 1994-1995 (S. Punta	inen & G. P. H. Styan) 8		
Linear Algebra and Its Applications-Forthcoming Special Issues			
Reports on Linear Algebra Events Attended			
September 24-2, 1993: Regina, Saskatchewan (D. R. Farenick & S. J. K	irkland) 9		
April 28-29, 1995: Lethbridge, Alberta (D. R. Farenick & S. J. Kirkland)			
May 27-28, 1994: Chattanooga, Tennessee (R. L. Smith)			
July 15–16, 1995: Montréal, Québec (G. P. H. Styan)			
Selected Forthcoming Linear Algebra Events			
August 16-19, 1995: Atlanta, Georgia			
October 13-14, 1995: Kalamazoo, Michigan			
October 16-18, 1995: Cambridge, Massachusetts			
January 10-13, 1996: Orlando, Florida			
August 12-16, 1996: Jilin, China			
International Calendar of Events in Linear Algebra and Related Topics	16		
Who is this Gentleman?			

Joint Editors: Steven J. LEON & George P. H. STYAN

Printed by the McGill University Printing Service • Printed in Canada

ILAS President/Vice-President Annual Report: June 1995

1. The following have been elected to ILAS offices as of March 1, 1995:

Vice-President: Daniel Hershkowitz (three-year term).

Board of Directors: Angelika Bunse-Gerstner (two-year term), Peter Lancaster (three-year term) Chi-Kwong Li (two-year term), Robert C. Thompson (three-year term).

In addition to the above, the following continue in their offices to which they were previously elected:

Hans Schneider: President; James R. Weaver: Secretary/Treasurer Richard A. Brualdi, Thomas J. Laffey: members of the Board of Directors.

The nominating committee, now consisting of Roger A. Horn (chair), Tsuyoshi Ando, Jose Perdigão Dias da Silva, Thomas J. Laffey and Paul M. Van Dooren, is preparing the 1995 elections (which includes the positions of President and Secretary/Treasurer).

2. A committee consisting of Richard A. Brualdi, Daniel Hershkowitz, Roger A. Horn, Steven J. Leon, Hans Schneider and James R. Weaver (chair) has been appointed by the President to propose changes in the ILAS bylaws in order to establish the publication of journals by ILAS. The proposed changes are to be discussed in the next meeting of the board of directors and the next ILAS business meeting, to be held in Atlanta, August 16–19, 1995.

3. ILAS-NET (Manager: Daniel Hershkowitz): In order to improve our service, ILAS-NET has been shifted to a new machine at the Technion (Haifa, Israel). As of June 19, 1995, we have circulated 472 ILAS-NET announcements. ILAS-NET currently has 591 subscribers.

4. ILAS Information Center–IIC (Manager: Daniel Hershkowitz): IIC has gone through major changes. It has been shifted to a new machine at the Technion (Haifa, Israel), and it now has a home page and is accessible via MOSAIC, XMOSAIC, NETSCAPE and LYNX, as well as by FTP and by e-mail. We have extended the services of IIC, which now include: General ILAS information, Information about paper journals, Links to electronic journals, Information about conferences, Links to institutional home pages, Links to personal home pages, Links to publishers, Other links of interest & Miscellaneous. In addition to the primary site at the Technion, the IIC operates two mirror sites in: Temple University, Philadelphia, USA and in the Technische Universität, Chemnitz, Germany. Since the shift to the new machine on December 21, 1994, IIC has handled over 8500 information requests.

5. A very successful meeting was held in Rotterdam, The Netherlands, in August 1994. There were 36 invited speakers and 160 participants from 36 countries; there were 4 minisymposia with 18 additional invited speakers. Organizing committee: Harm Bart (chair), Ludwig Elsner, Daniel Hershkowitz, Marinus A. Kaashoek, Thomas J. Laffey, Peter Lancaster, A. C. M. Ran, Hans Schneider & Ion Zaballa.

6. George P. H. Styan has been appointed editor of the ILAS Newsletter *Image*; he will serve jointly with Steven J. Leon. *Image* has been considerably expanded and further growth is projected with the forthcoming changes in the ILAS bylaws.

7. Membership dues are now \$20. Currently we have 355 members.

8. Dues for corporate members are now \$200. We have a very active corporate members committee (Carolyn Eschenbach, chair, LeRoy Beasley and David Lay). Currently we have 7 corporate members.

9. We have been successful in obtaining support for our 1995 Atlanta meeting from Georgia State University, NSF, NSA and the US Army. The meeting is now in the final stages of organization.

10. The following meetings and workshops are in various stages of preparation:

a. Summer 1995 ATLAST Workshop, Seattle, Washington, June 21–24, 1995. ATLAST Project Director: Steven J. Leon. Assistant Director: Richard Faulkenberry. Workshop presenter: Jane Day.

b. Summer 1995 ATLAST Workshop, Williamsburg, Virginia, July 19–22, 1995. ATLAST Project Director: Steven J. Leon. Assistant Director: Richard Faulkenberry. Workshop presenter: David Hill.

c. 5th ILAS Conference, Atlanta, Georgia, August 16-19, 1995. Organizing Committee: Biswa N. Datta, Frank J. Hall (co-chair), Robert E. Hartwig, Daniel Hershkowitz, Charles R. Johnson, Volker Mehrmann, Alex Pothen, Hans Schneider,

Frank Uhlig, Paul M. Van Dooren (co-chair), James R. Weaver & Margaret H. Wright. Local Arrangements Committee: Frank J. Hall (chair), M. Bakonyi, Jean Bevis, T. Brieske, G. Davis, M. Grady, Carolyn Eschenbach, Z. Li, F. Massey & V. Miller.

d. 6th ILAS Conference, Technische Universität Chemnitz-Zwickau, Chemnitz, August 14–17, 1996. Organizing Committee: Volker Mehrmann (chair), Bart De Moor, Graciano De Oliveira, Ludwig Elsner, Thomas J. Laffey, G. Michler, Michael Neumann & Frank Uhlig. Local Arrangements Committee: D. Happel, F. Lowke, C. Rost & B. Silbermann.

e. ILAS Workshop on Fast Algorithms for Control, Signals and Image Processing, Winnipeg, Manitoba, June 6–8, 1997. Organizing Committee: P.N. Shivakumar (chair), Peter Lancaster, Robert J. Plemmons, Dianne P. O'Leary, Hans Schneider. Program Committee: Robert J. Plemmons (co-chair), Dianne P. O'Leary (co-chair), Moody Chu, Brent Ellerbroek, Thomas Kailath, Peter Lancaster, Franklin Luk, Haesun Park, Hans Schneider, P.N. Shivakumar, Paul M. Van Dooren.

f. ILAS Conference, Madison, Wisconsin, June 3-6, 1998. Organizing Committee: Richard A. Brualdi (chair), Bryan Cain, Biswa Nath Datta, Jose Perdigão Dias da Silva, Shmuel Friedland, Moshe Goldberg, Uriel Rothblum, Jeffrey Stuart, Daniel Szyld & Richard S. Varga.

The results of the recent elections for ILAS officers are as follows:

President: Richard A. Brualdi Secretary/Treasurer: James R. Weaver Board of Directors: Rajendra Bhatia, Ludwig Elsner.

Brualdi, Bhatia and Elsner have been elected for three-year terms starting 1 March 1996. Weaver has been elected for a four-year term starting 1 March 1996.

My thanks are due to the nominations committee [R. A. Horn (chair), <u>T. Ando, J. A. Dias da Silva</u>, <u>T. J. Laffey and P. M. Van Dooren</u>] for organizing the election process. My thanks are also due to all candidates who agreed to run for ILAS offices.

Hans Schneider: President of ILAS

News from the ILAS Information Center-IIC

We are happy to announce the establishment of a mirror site for IIC in Chemnitz, Germany. The URL address of this new mirror site is http://www.tu-chemnitz.de/ftp-home/.m/fs75/math.technion.ac.il/iic/index.html. The database in Chemnitz gets updated on a daily basis.

There are three ways to use the services of IIC: MOSAIC, XMOSAIC, NETSCAPE or LYNX—by issuing the command "command http://math.technion.ac.il/iic" where command stands for mosaic, xmosaic, netscape or lynx. FTP—by anonymous FTP to "math.technion.ac.il" (for the IIC database change directory to "iic"). E-mail—by including the command "SEND http://math.technion.ac.il/iic/filename" (where "filename" is the file you request) in the mail body of a message sent to AGORA@MAIL.W3.ORG. The list of files that can be obtained from IIC is included in the file INDEX.HTML. Detailed instructions as to how to use IIC are included in the file IIC.GUIDE.

The IIC is happy to announce several new services:

(a) Links to Electronic journals: so far we have links to: The Electronic Journal of Combinatorics,

(b) Links to institutional home pages: so far we have links to (1) American Mathematical Society, (2) Mathematics Information Servers (PennState University), (3) The World-Wide Web Virtual Library: Math. (Florida State University), (4) Centre for Experimental & Constructive Mathematics (Simon Fraser University), (5) SIAM's undergraduate WWW pages, (6) Journal of Approximation Theory, (7) MacTutor History of Mathematics Archives, (8) Center for Scientific Computing (Finland), (9) Mathematics Archives–Mathematics Departments, (10) Home pages of various mathematics (& statistics) departments, (11) NA-NET home page

(c) Links to members' home pages (those who wish to have links from our database center to their home page should email their home page address to HERSHKOW@TECHUNIX.TECHNION.AC.IL).

ILAS Treasurer's Report: March 1, 1994-February 28, 1995

Balance on hand March 1, 1994		······································	
Certificate of Deposits (CD)	8,500.00		
Vanguard	7,159.94		
Checking Account 1	3,825.32		29,485.26
***********	********	********	****
Checking Account Balance on March 1, 1	994		<u>13,825.32</u>
March 1994			
Income:			
Interest (First Union)	18.52	18.52	
Expenses:			
Sec. of State	70.00	70.00	(51.48)
April 1994	<u></u>	<u></u>	<u>,,,,,,,,</u> ,,,,,,,,,,,,,,,,,,,,,,,,,,,,
Income:			
Dues	324.00		
Interest on CD (FU)	10.60		
Interest (First Union)	17.79		
Contributions			
Regular	18.00		
H. Schneider Prize	10.00		
F. Uhlig Ed. Fund	10.00		
OT/JT Lec. Fund	10.00	400.39	
Expenses:	00.00	00.00	400.39
May 1994			
Income:			
Dues	48.00		
Interest on CD (HS)	74.56		
Interest on CD (OT/JT)	29.00		
Interest (First Union)	19.82		
Contributions			
Regular	10.00		
H. Schneider Prize	10.00		
F. Uhlig Ed. Fund	10.00	201.38	
Expenses:	00.00	00.00	201.38
June 1994			
Income:			
Interest (First Union)	19.28	19.28	
Expenses:	00.00	00.00	<u>19.28</u>
<u>July 1994</u>			
Income:			
Dues	108.00		
Interest (First Union)	18.67		
Interest on CD (FU)	10.84		
Contributions			
OT/JT Lec. Fund	96.35	233.86	
Expenses:			
Postmaster	75.40		
Dixon Brothers Sporting Good	ds 178.69		
Preparation of Dues Notice			
Lisa M. Weaver	27.50	000 40	(460.00)
Shipping Poste (Dues Notice) <u>115.60</u>	397.19	(163.33)
August 1994			
Income:		0 4 0 5	
Interest (First Union)	21.06	21.06	~ ~ ~ ~
EXDenses:	00.00	00.00	21.06

by James R. Weaver, University of West Florida

			and the second
September 1994			
Income:			
Dues	1,544.00		
Interest (First Union)	21.99		
Interest on CD (HS)	75.38		
Interest on CD (OT/JT)	29.32		
T-Shirts	200.00		
Contributions			
Regular	211.50		
H. Schneider Prize	165.00		
F. Uhlig Ed. Fund	101.00		
OT/JT Lec. Fund	397.00	2,745.19	
Expenses:			
Xeroxing at EUR	75.00		
Postmaster	18.52		
Producing & Mailing "IMAGE"			
George P. H. Styan	505.86		
Mailing Expenses			
Steve Leon	11.50		
Office Depot (supplies)	51.50		
Exchange Rate	5.81	668.19	2.077.00
• • •			<u>uro:///00</u>
October 1994			
Income:			
Dues	510.00		
Interest (First Union)	24.00		
Interest on CD (HS)	76.23		
Interest on CD (OT/JT)	29.64		
Interest on CD (FU)	10.84		
Contributions			
Regular	58.00		
H. Schneider Prize	65.00		
F. Uhlig Ed. Fund	5.00		
OT/JT Lec. Fund	4.00	782.71	
Expenses:	00.00	00.00	782.71
November 1004			
TREATE INTERNET			
Dues Interest (Right to b)	462.00		
Interest (First Union)	24.19		
Contributions			
Kegular	141.00		
H. Schneider Prize	8.00	635.19	
Expenses:			
UIIICE Depot (Supplies)	10.68		
Preparation of Dues Notice			
Lisa M. Weaver	24.80		
The Shipping Poste			
Mailing Dues Notice	<u>135.70</u>	<u>174.18</u>	464.01
Decombor 1004			
Dues Interest (The total)	870.00		
Interest (First Union)	24.76		
Interest (F. Uhlig Ed. Fund)	10.72		
Bogular			
Regular H. Orba - J	38.00		
H. Schneider Prize	520.00		
r. Uhlig Ed. Fund	300.00		
OT/JT Lec. Fund	150.00		
Conference	51.00	1,964,48	

Expenses:			
Conference Travel			
Daniel Szyld	350.00		
Producing 100 extra copie	es		
Of IMAGE	123.37		
Xeroxing - UWF	29.54		
Preparing ballots			
Lisa M. Weaver	54.72		
Postmaster	59.16		
Postmaster	<u>197.73</u>	814.52	<u>1,149.96</u>
January 1995			
Income:			
Dues	296.00		
Interest (First Union)	28.18		
Interest on CD (HS)	76.23		
Interest on CD (OT/JT)	29.64		
Contributions			
H. Schneider Prize	140.00		
F. Uhlig Ed. Fund	120.00		
OT/JT Lec. Fund	30.00		
Conference	103.00		
Regular	61.00	884.05	
Expenses:			
Office Depot	42.74	42.74	<u>841.31</u>
February 1005			
February 1995			
Income:			
Dues Interest (Therest V.)	486.00		
Contributions	24.91		
H. Schneider Prize	6.00		
F. Uhlig Ed. Fund	3.00		
OT/JT Lec. Fund	3.00		
Conference	3.00	525.91	
Expenses:			
Postmaster	258.00		
Postmaster	157.64		
Preparation of flyers for	r 5th		
Conf. UWF Math Club	69.00	484.64	41.27
******	* * * * * * * * * * * * * *	*****	****
February 28, 1995			19,608.88
Account Balance			
Checking Account	19,608.88		
Certificate of Deposit (FU)	1,000.00		
Certificate of Deposit			
(72% HS & 28% OT/JT)	7,500.00		
Vanguard	-		
(72% HS & 28% OT/JT)	7,092.35		35,201.23
General Fund	11.142.92		
Frank Uhlig Educational Fund	2.502.81		
Hans Schneider Prize	12,987.66		
Olga Taussky Todd/John Todd Fund	5,550.61		
Conference Fund	3,017.23		35,201.23
***************************************	*****	******	****
		Jam	is R. Weaver
		' <	June 1, 1995
			1

In Memoriam

Arthur Asquith Rayner, Professor Emeritus of Statistics and Biometry at the University of Natal, Pietermaritzburg, South Africa, died on July 10, 1994; he was 77. Born in Dunedin, New Zealand, he studied mathematical statistics under A. C. Aitken at the University of Edinburgh, gaining his doctorate in 1947; in 1949 he founded the University of Natal Dept. of Biometry . He was Dean of the University of Natal Faculty of Agriculture and President of the South African Statistical Association. The book *Generalized Inverse Matrices with Applications to Statistics* (with R. M. Pringle, pub. Griffin, 1971) was one of the first three books on matrix generalized inverses. An obituary appears in the New Zealand Statistical Association Newsletter, September 1994, page 11.

Richard D. Sinkhorn, well known for his work in linear algebra and matrix theory, died in Houston, Texas, on April 8, 1995, following a stroke. He was awarded a PhD degree from the University of Wisconsin–Madison in 1962 and then joined the Mathematics Department of the University of Houston, where he quickly became a full Professor and supervised 11 PhD theses as well as many Masters students. In 1985 he was voted Top Professor by the University Mortar Board Society (a student organization) and received the College Teaching Excellence Award in 1992 from the College of Natural Science and Mathematics.

Albert William Tucker of mathematical programming and game theory fame and Professor Emeritus of Mathematics at Princeton University, died near Princeton, on January 25, 1995; he was 89. The Kuhn-Tucker Theorem is the cornerstone of nonlinear programming. He was President of the Mathematical Association of America (MAA), Vice-President of the American Association for the Advancement of Science (AAAS), and Chair of the Conference Board of the Mathematical Sciences (CBMS). An obituary by Stephen B. Maurer appears in *SIAM News*, July 1995, page 15.

Honors and Awards

Persi Diaconis of the Dept. of Mathematics, Harvard University, was elected a Member of the US National Academy of Sciences on April 24, 1995; he gave an invited address on geometry and eigenvalues at the 5th SIAM Conference on Applied Linear Algebra, Snowbird, Utah, June 1994.

Colyampudi Rachakrishna Rao, Eberly Professor of Statistics and Director of the Center for Multivariate Analysis, Pennsylvania State University, University Park, was elected a Member of the US National Academy of Sciences in April 1995; he gave an invited plenary talk on new ways of dealing with multicollinearity at the 5th International Workshop on Matrix Methods in Statistics, Montréal, Québec, July 1995. The book *Generalized Inverse of Matrices and Its Applica-tions* (with Sujit Kumar Mitra, pub. Wiley, 1971) was one of the first three books on matrix generalized inverses.

Doncid Wilford Robinson of the Dept. of Mathematics, Brigham Young University, Provo, Utah, received a Certificate of Meritorious Service to the Mathematical Association of America at the Joint Mathematics Meetings in San Francisco, California, January 5, 1995.

LMITOOL: An Interface for Solving LMI Problems

A user-friendly MATLAB package for Linear Matrix Inequality (LMI) optimization, called LMITOOL, has been developed by Laurent El Ghaoui, François Delebecque & Ramine Nikoukhah. This package acts as an interface for the Semidefinite Programming package SP developed by L. Vandenberghe & S. Boyd. LMITOOL (version 1.0) and SP are now both available on the Internet: send e-mail to ELGHAOUI@ENSTA.FR for information on how to get these packages.

Using LMITOOL, a user can in a few minutes solve Linear Matrix Inequality problems with matrix variables. All one has to do is to specify the LMI constraints and linear objective of the problem at hand in a matlab .m file. No special syntax or function is to be learned by the user. LMITOOL allows for arbitrary equality and LMI constraints. The LMITOOL package includes: All source code, a user's guide (a short one, as the package is very easy to learn), a set of control problems solved using LMITOOL (e.g., mixed H2/H-infinity control). A similar package is also available for the MATLAB-like package SCILAB (send e-mail to SCILAB@INRIA.FR for information).

New Officers of the SIAM Activity Group on Linear Algebra

As the result of the election held this past fall, the new officers of the SIAM Activity Group on Linear Algebra (SIAG/LA) are as follows:

Chair: Paul M. Van Dooren, Vice-Chair: Biswa Nath Datta Secretary: Alan Edelman, Program Director: John R. Gilbert.

They will serve for three year terms, ending December 31, 1997. John G. Lewis is the Past-Chair; Julia Olkin and Juan Meza continue to serve as editors of their electronic newsletter.

More Books on Linear Algebra and Related Topics: 1994–1995

by Simo Puntanen, University of Tampere & George P. H. Styan, McGill University

Listed below are some more books on linear algebra and related topics that have been published in 1994 or in 1995 (or are in press for publication in 1995 or 1996); this list augments and updates that published in *Image* 14:23–26. References to reviews in *Mathematical Reviews* [MR] are given in square brackets; (P) denotes paperback and (H) hard cover.

- Agarwal, Ravi P. & Pang, Peter Y. H. (1995). Opial Inequalities with Applications in Differential and Difference Equations. Mathematics and Its Applications, vol. 320. Kluwer, x + 393 pp., ISBN 0-7923-3365-9.
- Anderson, E.; Bai, Z.; Bischof, C.; Demmel, James; Dongarra, Jack J.; Du Croz, J.; Greenbaum, A.; Hammarling, S. J.; McKenney, A.; Ostrouchov, S. & Sorensen, Danny C. (1995). LAPACK Users' Guide. Second Edition. SIAM, xix + 325 pp., ISBN 0-89871-345-5 (P). [Original version: 1992, xv + 235 pp., Image 9:20-22]
- Bau, David & Trefethen, Nick. *Numerical Linear Algebra*. Publication expected in 1996 (by SIAM). [Table of contents & sample chapters available at http://www.cs.cornell.edu/Info/People/Int/Int.html]
- Bellman, Richard (1995). Introduction to Matrix Analysis. Reprint Edition. Classics in Applied Mathematics, vol. 12. SIAM, Philadelphia, xx + 328 pp., ISBN 0-89871-346-3 (P). [Reprint of the First Edition: 1960, McGraw-Hill, xx + 328 pp., MR 23:A153; Second Edition: 1970, McGraw-Hill, xxiii + 403 pp. MR 41:3493]
- Brown, J. David; Chu, Moody T.; Ellison, Donald C. & Plemmons, Robert J., eds. (1994). Proceedings of the Cornelius Lanczos International Centenary Conference. SIAM, 1xv + 644 pp., ISBN 0-89871-339-0 (P). [Conference held at Raleigh, North Carolina, December 12–17, 1993.]
- Datta, Biswa Nath (1995). Numerical Linear Algebra and Applications. Brooks/Cole, xxii + 680 pp., ISBN 0-534-17466-3.
- Gauss, Karl Friedrich (1995). Theory of the Combination of Observations Least Subject to Errors: Part One, Part Two, Supplement. Translated by & with an Afterword by G. W. Stewart. Classics in Applied Mathematics, vol. 11. SIAM, xi + 241 pp., ISBN 0-89871-347-1 (P).
- Gilbert, Jimmie & Gilbert, Linda (1995). Linear Algebra and Matrix Theory. Academic Press, x + 394 pp., ISBN 0-12-282970-0.
- Higham, Nicholas J. (1996). Accuracy and Stability of Numerical Algorithms. SIAM, ca. 700 pp., in press (publication expected in January 1996), ISBN 0-89871-355-2 (P).
- Johnson, Eugene W. (1995). Linear Algebra with MATHEMATICA[®]. Brooks/Cole, xi + 174 pp., ISBN 0-534-13068-2 (P).
- Kolman, Bernard (1996). Elementary Linear Algebra. Sixth Edition. Prentice Hall ca. 576 pp., ISBN 0-13-374729-8.
 [Original version: 1970, Macmillan; Second Edition: 1977; Third: 1982, xii + 356 pp. & Answer Manual prepared by James Brooks, 53 pp. (P); Fourth: 1986; Fifth: 1991, xix + 487 pp.]
- Lawson, Charles L. & Hanson, Richard J. Solving Least Squares Problems. Second Edition. Classics in Applied Mathematics, vol. 15. SIAM, ca. 355 pp., in press (expected September 1995), ISBN 0-89871-356-0 (P). [Original version: 1974, Prentice-Hall, xii + 340 pp., MR 51:2270]
- Lawson, Terry (1996). Linear Algebra. Wiley, ISBN 0-471-30897-8.
- Mangasarian, Olvi L. (1994). Nonlinear Programming. Corrected Reprint Edition. Classics in Applied Mathematics, vol. 10. SIAM, xv + 220 pp., ISBN 0-89871-341-2 (P). [Original version: 1969, McGraw-Hill]
- Messer, Robert (1994). Linear Algebra: Gateway to Mathematics. HarperCollins, x + 403 pp., ISBN 0-06-501728-5.

Moonen, M. & De Moor, Bart, eds. (1995). SVD and Signal Processing III, Algorithms, Architectures and Applications. Proceedings of the 3rd International Workshop, Leuven, Belgium, 22-25 August 1994. Elsevier Science, 498 pp., ISBN 0-444-82107-4.

Robbin, Joel (1994). Matrix Algebra using MINImal MATlab. AK Peters, ISBN 1-56881-024-5.

Sigmon, Kermit. MATLAB[®] Primer. Fourth Edition. CRC Press, x + 101 pp., ISBN 0-8493-9440-6 (P). [Image 13:7. Original version: 1989, Dept. of Mathematics, University of Florida, Gainesville, ii + 22 pp. (P); Third Edition: 1993.]

Linear Algebra and Its Applications—Forthcoming Special Issues

- Proceedings of the Fourth Conference of the International Linear Algebra Society (Rotterdam, August 1994). Special Editors: Harm Bart, Ludwig Elsner & Andre Ran.
- Proceedings of the Fifth Conference of the International Linear Algebra Society (Atlanta, August 1995). Special Editors: Frank J. Hall, Alex Pothen, Frank Uhlig & Paul M Van Dooren.

Special Issue Honoring J. J. Seidel. Special Editors: Aart Blokhuis, Willem H. Haemers & Alan J. Hoffman.

- Fifth Special Issue on Linear Algebra and Statistics: Dedicated to C. R. Rao in Celebration of his 75th Birthday. Special Editors: R. B. Bapat, George P. H. Styan & Hans Joachim Werner.
- A Guide to Books on Matrices and Books on Inequalities, with Statistical and Other Applications by George P. H. Styan & Simo Puntanen.

Special issues of *Linear Algebra and Its Applications* (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

Western Canada Linear Algebra Meetings:

Regina, Saskatchewan: September 24–25, 1993

Lethbridge, Alberta: April 28–29, 1995

Report by Douglas R. Farenick & Stephen J. Kirkland

The Western Canada Linear Algebra Meeting (W-CLAM) provides an opportunity for mathematicians in Western Canada working in linear algebra and related fields to meet, present accounts of their recent research, and to have informal discussions. Although this meeting has a regional base, W-CLAM also attracts researchers from outside the area who come to the meetings and develop contacts here. The first two of these meetings were held in Regina and Lethbridge and each attracted 20-30 participants, including people from other parts of Canada, as well as from Denmark, Greece, Korea, Spain & USA.

The speakers at the Regina meeting were A. Akkerman, S. Cabay, R. Craigen, D. R. Farenick, L. Jodar, S. J. Kirkland, P. Lancaster, L. Marcoux, J. J. McDonald, R. Meleshko, S. Neufeld, M. Rakowski, K. Taylor, M. Tsatsomeros, P. van den Driessche, and P. Zizler. Lectures in Lethbridge were presented by S. Ambikkumar, B. Cain, R. Craigen, D. R. Farenick, H. Karaghani, S. J. Kirkland, M. Krupnik, P. Lancaster, C. Muses, K. Taylor, M. Tsatsomeros, and P. Zizler.

The presentations at the meetings involved research in linear algebra, matrix theory, operator theory, combinatorics, designs, mathematical chemistry, mathematical physics, population dynamics, numerical analysis, differential equations, and linear control theory. In light of the level of interest at the Regina and Lethbridge meetings, further W-CLAMs are anticipated.

First Southeastern Linear Algebra Conference

Chattanooga, Tennessee: May 27-28, 1994

We are very grateful to Ronald L. Smith for identifying the three remaining persons in the photo published in *Image* 13:10 (see also 14:30): $y_1 =$ Floyd Christian, $y_2 =$ Rohan Hemasinha, $y_3 =$ Ann-Loise Klaus.

Fourth International Workshop on Matrix Methods for Statistics

Montréal, Québec: July 15-16, 1995

Report by George P. H. Styan

The Fourth International Workshop on Matrix Methods for Statistics was held in Montréal on Saturday, July 15 and Sunday, July 16, 1995, the weekend immediately following the Joint Annual Meeting of the Statistical Society of Canada (SSC) and the Institute of Mathematical Statistics (IMS). This Workshop was co-sponsored by the International Linear Algebra Society (ILAS). The International Organizing Committee comprised R. William Farebrother (Univ. of Manchester), Simo Puntanen (Univ. of Tampere), George P. H. Styan (McGill University; chair), and Hans Joachim Werner (Universität Bonn). This Workshop is the fourth in a series. The previous three Workshops were held as follows: (1) Tampere, Finland: August 1990, (2) Auckland, New Zealand: December 1992, and (3) Tartu, Estonia: May 1994. The 5th Workshop in this series is scheduled to held in Shrewsbury, England, July 1996.

The purpose of this Workshop was to stimulate research and, in an informal setting, to foster the interaction of researchers in the interface between matrix theory and statistics. Invited guest speakers came from: Canada, Chile, China, Czech Republic, Finland, Germany, India, The Netherlands, New Zealand, Poland, Portugal, Slovenia, Sweden, Turkey, United Kingdom, and the United States. Funding for non-Canadian guest speakers' travel and local expenses was supported in part by the Natural Sciences and Engineering Research Council of Canada (NSERC). There were 56 papers presented in person (8 plenary and 48 in three parallel sessions) and 5 by title. It is expected that papers from this Fourth International Workshop on Matrix Methods for Statistics will be published in the Sixth Special Issue on Linear Algebra and Statistics of *Linear Algebra and Its Applications*.

The eight plenary talks were:

Anderson* & Stephens: Matrix methods in computation of distributions of goodness-of-fit statistics Farebrother: A. C. Aitken and the consolidation of matrix theory Fiedler: Some new results on Hermitian and positive definite matrices Golub: Method of moments and statistical computations Mitra* & Prasad: The nonunique parallel sum Olkin: A. C. Aitken and compound matrices Rao* & Suryawanshi: Some new ways of dealing with multicollinearity in a regression problem Thompson: On the von Neumann trace inequality for singular values. The other 48 talks were: Ahmed* & Bashirullah: Improved biased estimation in a regression model Akdeniz: MSE comparisons of some biased estimators in the linear regression model Ambikkumar* & Drury: Some remarks on the Boyle-Handelman conjecture

Andersson & Perlman*: Lattice conditional independence models for seemingly unrelated regressions

Andersson* & Perlman: Matrix invariance groups for lattice conditional independence models Bebiano: Bounds for the determinant of matrix sums

Bhimasankaram & Saharay*: On a partitioned linear model and some associated reduced models

Bondar: A partial interlacing theorem for eigenvalues of products and application to MANOVA

Cao-Huu: On computing eigenvalues and eigenvectors of large image matrices for positron emission tomography

Summer 1995

Carvalho: A joint estimator for the eigenvalues of the reproduction mean matrix of a multitype Galton-Watson process Chang* & Paige: New perturbation bounds for the Cholesky factorization Dutilleul: Maximum likelihood estimation for the matrix normal distribution Farenick: Convexity with matrix coefficients Firinguetti Limone: A note on a less than full rank system of seemingly unrelated regression equations model Flournoy et al: Stationarity in sequential response-driven designs Fortiana* & Cuadras: A family of matrices, the discretized Brownian bridge and distance-based regression Groß: On contractions in linear regression Groß & Trenkler*: On the equality of GLSE and Amemiya's partially generalized least squares estimator Harville: Use of the Gibbs sampler to invert large, sparse, positive definite matrices Hodgess* & Wei: Temporal disaggregation of bivariate time series Horn & Olkin*: When does A*A = B*B and why does one want to know? Im: Observation contemporaneity and GLS efficiency gain in the context of identical regressors Kovačec: The conjecture of Marcus and de Oliveira Kozek: On application of local latent roots in nonparametric regression estimation Leite: Matrix problems arising in nonlinear control Liu* & Neudecker: Kantorovich inequalities involving positive semidefinite matrices and efficiency comparisons in linear models Liu & Neudecker*: Matrix trace Cauchy-Schwarz inequalities and applications in canonical correlation analysis Markiewicz: Induced Kiefer orderings and comparison of experiments Merikoski et al: Bounds for eigenvalues using the trace and determinant Metz: Shorted operators: an application in potential theory Mever: Convex analysis and matrix methods in multidimensional scaling Nordström & Mathew*: Inequalities for sums of matrix quadratic forms Omladič & Omladič: A linear algebra approach to non-transitive expected utility Polotski & Shukhman: Point estimation of mean and variance in the correlated time series equations model Prasad: Rank 1 factors, minus order and shorted matrices Provost: On the Craig-Sakamoto theorem and its generalisations Puntanen* & Scott: Some further remarks on the singular linear model Rosenberger et al: Rates of convergence for the generalized Pólya urn Searle: The matrix handling of BLUE and BLUP in the mixed linear model. Semrl: On a matrix version of Cochran's theorem Styan & Subak-Sharpe*: The Campbell-Youla generalized inverse and a consequent fundamental property of resistive electri cal networks Sultan* & Tracy: Moments of complex multivariate normal distribution Tian: Completing block matrices with maximal and minimal ranks Tong: The role of the covariance matrix in the least-squares estimation for a common mean von Rosen: A generalized complex normal distribution Watson: Inequalities associated with the efficiency of least squares: history and comments Werner* & Yapar: A BLUE decomposition in the general linear regression model Wolkowicz: Applications of semidefinite programming: linear programming for the 90s and 00s. In addition five papers were presented by title: Kollo* & von Rosen: Low-dimensional distributions via high-dimensional distributions Majumdar: On optimality of duals of optimal block designs Marsaglia: Generating random matrices Tian: Reverse order laws for the generalized inverses of multiple matrix products Wang: Unified theory of least squares and partial ordering of matrices.

Copies of the Programme booklet (with abstracts of all 61 papers in both English and French) are available (free of charge, while supply lasts) from: George P. H. Styan, Dept. of Mathematics and Statistics, McGill University, Burnside Hall, 805 ouest, rue Sherbrooke, Montréal, Québec, Canada H3A 2K6; MT56@MUSICA.MCGILL.CA, FAX (1-514) 398-3899.





Photograph by Simo Puntanen

Selected Forthcoming Linear Algebra Events

Fifth Conference of the International Linear Algebra Society

Atlanta, Georgia: August 16–19, 1995

Hosted by The International Linear Algebra Society (ILAS) and Georgia State University, this Fifth ILAS Conference will be held in the Urban Life Conference Center, Georgia State University, 140 Decatur Street, Atlanta, Georgia, August 16-19, 1995. The purpose of this conference is to bring together researchers/educators in all fields of linear algebra/matrix analysis, pure and applied, allowing a broad interchange of ideas and discussion of recent developments in these areas. The conference will focus on the usual topics of the ILAS conferences, but in addition will put special emphasis on education of linear algebra and on structured matrices. The conference is being supported by Georgia State University and preliminary commitments have also been made by the National Science Foundation and the National Security Agency.

The Organizing Committee comprises: Biswa Nath Datta, Frank J. Hall (co-chair), Robert E. Hartwig, Daniel Hershkowitz, Charles R. Johnson, Volker Mehrmann, Alex Pothen, Hans Schneider, Frank Uhlig, Paul M. Van Dooren (cochair), James R. Weaver, Margaret H. Wright. The Local Arrangements Committee comprises: Frank J. Hall (chair), M. Bakonyi, Jean Bevis, T. Brieske, G. Davis, M. Grady, Carolyn Eschenbach, Z. Li, F. Massey & V. Miller.

The invited speakers are: Greg Ammar (Northern Illinois University, USA), Wayne Barrett (Brigham Young University, USA), Harm Bart (Erasmus University, The Netherlands), Angelika Bunse-Gerstner (Universität Bremen, Germany), Ludwig Elsner (Universität Bielefeld, Germany), Shmuel Friedland (Hans Schneider Prize Winner, University of Chicago, USA), John R. Gilbert (Xerox Park, USA), Guershon Harel (Purdue University, USA), Roger A. Horn (University of Utah, USA), Ilse Ipsen (North Carolina State University, USA), Rein Kaashoek (Vrije Universiteit van Amsterdam, The Netherlands), Thomas J. Laffey (University College of Dublin, Ireland), Carl D. Meyer, Jr. (North Carolina State University, USA), Cleve Moler (Mathworks, USA), Michael Neumann (University of Connecticut, USA), Morris Newman (University of California–Santa Barbara, USA), Wilhelm Niethammer (Universität Karlsruhe, Germany), Dale Olesky (University of Victoria, Canada), & Gilbert Strang (banquet speaker, Massachusetts Institute of Technology, USA). There will be minisymposia on: Sparse matrices (A. Pothen); Structured matrices (G. Heinig, A. Sayed); Linear algebra in undergraduate education (F. Uhlig, D, Carlson); Distance matrices, geometry and applications (P. Tarazaga).

A special issue of *Linear Algebra and its Applications* with editors Frank J. Hall, Alex Pothen, Frank Uhlig, and Paul M. Van Dooren will publish the conference proceedings. This issue will contain only papers that meet the publication standards of the journal and that are approved by the normal refereeing processes. Submission deadline for papers is November 30, 1995.

Accommodation. Blocks of rooms have been reserved at the following hotels: Radisson Hotel–Atlanta, 165 Courtland Street NE, Atlanta, GA 30303; tel. (1-404) 659-6500, (1-800) 833-8624, FAX (1-404) 524-1259; The Suite Hotel–Underground Atlanta, 54 Peachtree St. at Upper Alabama, Atlanta, GA 30303; tel. (1-404) 223-5555, (1-800) 477-5549, FAX (1-404) 223-0467. Rates at the Radisson Hotel–Atlanta are \$70 (plus tax) per room with single or double occupancy. Extra charge for third person in a room is \$10. All persons 18 years of age or younger are free of charge when staying in a room with an adult. A limited number of rooms have been reserved for students at \$70 (plus tax) for 1-4 people. Parking fee is \$3 per day for ILAS participants. The Radisson Hotel is approximately 0.8 miles from the Georgia State University Conference Center. Rates at The Suite Hotel/Underground Atlanta are \$81 (plus tax) single and \$91 (plus tax) double. Extra charge for third person in a room is \$10. Valet parking is available for \$12/day with unlimited entry and exit. The Suite Hotel is approximately 0.4 miles form the Georgia State University Conference Center. Please make your reservations directly with the hotel and mention that you are attending the International Linear Algebra Conference. Reservations must be made by July 14, 1995, to receive the room rates listed.

Transportation. The Fifth Conference of the International Linear Algebra Society has selected Delta Air Lines Inc. and Carlson Wagonlit Travel as the official air carrier and agency for the August 16–19, 1995 conference. Delta Air Lines is offering special discounted meeting fares. To take advantage of Delta's special fares follow these steps: 1. Call Carlson Wagonlit Travel at (1-800) 999-5430 and tell the reservationist you are attending the International Linear Algebra Society Conference in Atlanta, Georgia. 2. Give the dates you wish to travel. 3. Have the credit card of your choice ready to give to the reservationist. 4. Give the address where tickets should be mailed and a contact telephone number. 5. Review the schedule and price with the reservationist and your ticketing is complete. Rental car services can also be arranged through Carlson

Wagonlit Travel. Taxi fare from Atlanta International Airport is based on the number of passengers in the cab—\$15/one person, \$16/two people and \$6 each for three or more passengers. Bus shuttle service is \$8/person. MARTA, our rapid rail system, costs \$1.25 one way and is located in Delta Airlines' baggage pickup area in the South Terminal. The MARTA system will deposit you within walking distance of both hotels.

Third Symposium on Matrix Analysis & Applications: A Look at Recent Developments

Kalamazoo, Michigan: October 13-14, 1995

The Principal Speakers will be: Richard A. Brualdi (University of Wisconsin-Madison), P. J. Eberlein (SUNY at Buffalo), Roger A. Horn (University of Utah), Charles R. Johnson (College of William & Mary) & G. W. Stewart (University of Maryland). There will be additional invited speakers as well as 20 minute contributed talks. The organizers invite the participation of both specialists and non-specialists interested in matrix analysis and its applications to other fields. Graduate students are also encouraged to submit abstracts for consideration. Preceding the symposium, at 4 pm on Thursday, 12 October 1995, there will be a University Visiting Scholar Lecture by Charles R. Johnson entitled "Ideas of Modern Matrix Analysis". A banquet is planned for the Friday evening.

The deadline for submitting abstracts is August 14, 1995. E-mail submission is welcome. Organizing Committee: Yousef Alavi, John Petro and Niloufer Mackey, Western Michigan University. To submit abstracts or for further information contact: Niloufer Mackey, Dept. of Mathematics & Statistics, Western Michigan University, Kalamazoo, MI 49008-5152; NIL.MACKEY@WMICH.EDU, tel. (1-616) 387-4594, FAX (1-616) 387-4530.

MATLAB Conference

Cambridge, Massachusetts: October 16-18, 1995

Every two years The MathWorks hosts a MATLAB Conference for customers using MATLAB, SIMULINK and the family of toolboxes. The 1995 MATLAB Conference will be held October 16-18 at the Hyatt Regency in Cambridge, Massachusetts. The conference offers users a chance for direct technical exchange with other users, The MathWorks technical staff, toolbox authors and 3rd party vendors. The conference is a combination of industry leaders in signal processing, fuzzy logic, engineering, controls and mathematics; minicourse classes; expository talks by engineers and toolbox authors; and user-contributed presentations. Additionally, The MathWorks provides a fully equipped and staffed computer lab loaded with the latest products. Special Speakers: John N. Little (President, The MathWorks, Inc.), Cleve Moler (Chief Scientist, The MathWorks, Inc.): "Matrix: Mother of all Data Structures", Ronald W. Schafer (Georgia Institute of Technology), Lotfi Zadeh (University of California, Berkeley).

Minicourses, in the form of a teaching lab, will offer attendees the opportunity to get a hands-on look at our recently released and upcoming products. Minicourses are two hours in length and combine lectures and interactive tutorials. Classes include DSP Design, Fuzzy Logic, System Identification, Image Processing, Statistics, and Symbolic Math. Over 40 Expository Talks are scheduled for this MATLAB Conference. Topics include: DSP Design, Mathematics, Controls, Simulation, Image Processing, and Advanced Signal Processing. User Contributed Presentations, organized in categories including controls, education, electrical engineering, fuzzy logic, image processing, mathematics, real-time applications, signal processing, and simulation, will be given.

Registration fees are \$495 for commercial customers, \$295 for educational institutions and universities, and \$75 for fulltime students with a valid ID. Rooms have been reserved for Conference attendees at the Hyatt Regency. For hotel registration, please call the Hyatt Regency at (1-617) 429-1234. For more information regarding the technical program or registration, call (1-508) 647-4226, FAX (1-508) 653-6284, e-mail: CONFERENCE@MATHWORKS.COM, or write The Math Works Inc., 24 Prime Park Way, Natick, MA 01760. Additional information can also be found by visiting The MathWorks homepage, URL: http://www.mathworks.com.

MAA Linear Algebra Session of Contributed Papers

Orlando, Florida: January 10–13, 1996

There will be an MAA Linear Algebra session of contributed papers at the Joint Meetings of the AMS (American Mathematical Society) and MAA (Mathematical Association of America) in Orlando, Florida, January 10-13,1996. Session Announcement: Innovations in Teaching Linear Algebra: Wednesday afternoon, Thursday evening, and Friday afternoon. Organizers: Donald LaTorre, David Lay & Steven J. Leon.

The teaching of undergraduate linear algebra is undergoing substantial change. This session invites papers on personal experiences with innovations in teaching linear algebra, including: (1) The creative use of computer algebra systems, super calculators, or computer software; (2) Experiences with the NSF-funded ATLAST workshops; (3) Experiences with the core curriculum recommended by the Linear Algebra Curriculum Study Group (LACSG); (4) "Gems" of exposition in linear algebra; and (5) Other innovative teaching initiatives in undergraduate linear algebra.

Procedure for submitting papers: Anyone wishing to present a paper must send a one-page summary of the paper to the session coordinator: Steven J. Leon, Dept. of Mathematics, University of Massachusetts-Dartmouth, Old Westport Road, North Dartmouth, MA 02747-2300; SLEON@UMASSD.EDU, FAX (1-508) 999-8901. All summaries must be received by August 25, 1995. The summary should enable the organizers to evaluate the appropriateness of your paper for the session. Consequently, you should include as much detailed information as possible within the one-page limitation. The session coordinator will acknowledge receipt of all summaries. If your paper is accepted, you will be sent a standard MAA abstract form. Use this form to prepare a brief abstract. Please return the completed abstract form to the session coordinator by Friday, September 8, 1995. Abstracts received after the deadline will not be published.

Second China Matrix Theory Conference

Jilin, China: August 12–16, 1996

The 2nd China Matrix Theory Conference will take place in Jilin, China, from August 12-16, 1996. Supported by the Chinese Mathematical Society and Jilin Normal College, this conference is being organized by a national committee with the collaboration of the Mathematics Department at Jilin Normal College. A conference proceedings will be published. The Chinese Linear Algebra Society (CLAS) will be founded at this conference. For further information, please contact: Bit-Shun Tam, Dept. of Mathematics, Tamkang University, Tamsui, 25137, Taiwan; BSM01@HPAP.TKU.EDU.TW, tel. (886-2)-621-5656 ext. 828, FAX (886-2) 620-9916.

International Calendar of Events in Linear Algebra & Related Topics

1995

August 16–19: Atlanta, Georgia. International Linear Algebra Society (ILAS): 5th Conference. Minisymposia: Sparse Matrices, Structured Matrices, Linear Algebra in Undergraduate Education, Distance Matrices, Geometry & Applications. Georgia State University. [FJ Hall, Dept of Mathematics & Computer Science, Georgia State University, Atlanta, GA 30303; FHALL@CS.GSU.EDU] See Image 14:40–41, 15:14.

August 17: Atlanta, Georgia. ILAS Mini-Symposium on Educational Issues in Linear Algebra. Georgia State University [DH Carlson, Dept of Mathematical Sciences, San Diego State University, San Diego, CA 92182-7720; FAX (1-619) 594-6746, CARLSON@MATH.SDSU.EDU] See Image 14:41.

August 21–29: Beijing, China. International Statistical Institute: 50th Biennial Session. Beijing International Convention Center. [ISI Permanent Office, 428 Prinses Beatrixlaan, Postbus 950, NL-2270 AZ Voorburg; FAX (31-70) 38-60025, ISI@CS.VU.NL] August 28-September 1: Dunedin, New Zealand. A. C. Aitken Centenary Conference, 3rd Pacific Statistical Congress & New Zealand Statistical Association Annual Meeting. Session on Matrix Methods for Statistics. Univ 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]

September 3: Harrogate, North Yorkshire. Parallel Processing under MATLAB: One-day Tutorial as part of World Transputer Congress. Royal Baths Assembly Rooms. [http://faith.swan.ac.uk/chris.html/MUGUK/muguk.html; J. Kadlec, J.KADLEC@EE.QUB.AC.UK]

September 25-29: Toulouse, France. Workshop on Linear Algebra in Optimization. Part of Linear Algebra Year at CERFACS. [C Puglisi, Parallel Algorithm Team, CERFACS, 42 avenue G Coriolis, F-31057 Toulouse Cedex; FAX (33) 61.19.30.00, WLAY@CERFACS.FR, http://www.cerfacs.fr/~wlay/LAY/lay.html] See Image 14:36.

October 13-14: Kalamazoo, Michigan. 3rd Symposium on Matrix Analysis & Applications: A Look at Recent Developments. Western Michigan University. [Niloufer Mackey, Dept of Mathematics & Statistics, Western Michigan University, Kalamazoo, MI 49008-5152; NIL.MACKEY@WMICH.EDU, FAX (1-616) 387-4530] See Image 15:15.

October 16-18: Cambridge, Massachusetts. MATLAB Conference. Hyatt Regency Cambridge. Keynote Speech by Cleve Moler on "Matrix: Mother of all Data Structures". [The Math Works Inc., 24 Prime Park Way, Natick, MA 01760; FAX (1-508) 653-6284, CONFERENCE@MATHWORKS.COM] See Image 15:15.

October 16-20: Toulouse, France. Workshop on Eigenvalues & Beyond. Part of Linear Algebra Year at CERFACS. [C Puglisi, Parallel Algorithm Team, CERFACS, 42 avenue G Coriolis, F-31057 Toulouse Cedex; FAX (33) 61.19.30.00, WLAY@CERFACS.FR, http://www.cerfacs.fr/~wlay/LAY/lay.html] See Image 14:36.

October 23-26: Charlotte, North Carolina. SIAM Annual Meeting. Adam's Mark Hotel. [SIAM, 3600 University City Science Center, Philadelphia, PA 19104-2688; MEETINGS@SIAM.ORG, FAX (1-215) 386-7999, tel. (1-800) 447-SIAM (USA only)]

December 7-8: Lódz, Poland. 14th Conference on Multivariate Statistical Analysis: MSA'95. Univ of Lódź. A. Rossa, Dept of Statistical Methods, Institute of Econometrics & Statistics, Univ of Lódź, Rewolucji 1905r. 41, PL 90-214 Lódź; KATSTAT@KRYSIA.UNI.LODZ.PL, FAX (48-42) 78.39.58]

1996

January 10-13: Orlando, Florida. Joint Mathematics Meetings: American Mathematical Society (AMS) & Mathematical Association of America (MAA). MAA Session of Contributed Papers: "Innovations in Teaching Linear Algebra". [Steven J. Leon, Dept. of Mathematics, University of Massachusetts-Dartmouth, Old Westport Road, North Dartmouth, MA 02747-2300; SLEON@UMASSD.EDU, FAX (1-508) 999-8901.] See Image 15:16.

April 1-4: York, England. State of the Art in Numerical Analysis. [Program Chair: G Alistair Watson, Dept of Math & Computer Science, Dundee University, Dundee DD1 4HN, Scotland; GAWATSON@MCS.DUNDEE.AC.UK]

May 20-22: Victoria, British Columbia. Triennial SIAM Meeting on Optimization. [B Buckley, Dept of Mathematics, Royal Roads Military College, FMO Victoria, BC V0S 1B0, BBUCKLEY@POST.ROYALROADS.CA]

June 12-15: Newport, Rhode Island. ATLAST Workshop. Salve Regina University. [Steven J. Leon, Dept. of Mathematics, University of Massachusetts-Dartmouth, Old Westport Road, North Dartmouth, MA 02747-2300; FAX (1-508) 999-8901, SLEON@UMASSD.EDU]

June 17-21: Pontresina, Switzerland. 13th Householder Symposium on Numerical Algebra. Hotel Kronenhof. [Dianne P. O'Leary, Chair: Program Committee; OLEARY@CS.UMD.EDU]

June 20-21: Belgrade, Serbia-Yugoslavia. Dragoslav S. Mitrinović (1908–1995) Memorial Conference. Serbian Scientific Society. [Gradimir V. Milovanović, Faculty of Electronic Engineering, P. O. Box 73, 18000 Nis, Serbia-Yugoslavia; MILOVANOVIC@IPRVS1.UNIV-PAU.FR]

June 24-28: St. Louis, Missouri. International Symposium on the Mathematical Theory of Networks and Systems. Washington University. [Biswa Nath Datta, Dept of Mathematical Sciences, Northern Illinois University, DeKalb, IL 60115; FAX (1-815) 753-1112, DATTAB@MATH.NIU.EDU]

July 7–12: SycIney, Australia. Sydney International Statistical Congress: SISC-96. IMS Special Topics Meeting: Contemporary Nonparametrics; 13th Australian Statistical Conference: Quality & Environment; Computer Science & Statistics: 28th Symposium on the Interface. Sheraton-Wentworth Hotel. [John Mulready, Conference Action Pty Ltd, PO Box 1231, North Sydney, NSW 2059; SYDNEY96@SYD.DMS.CSIRO.AU, FAX (61-2) 956-5154]

July 8–12: Progue, Czech Republic. Prague Mathematical Conference in Honor of the 70th Birthdays of Ivo Babuška, Miroslav Fiedler, Jaroslav Kurzweil & Vlastimil Pták. [Mathematical Institute, Academy of Sciences, Zitná 25, CZ-115 67 Praha 1; FAX (422-2) 422-7633, PMC96@EARN.CVUT.CZ] July (3rd or 4th week): Shrewsbury, England. 5th International Workshop on Matrix Methods for Statistics. [RW Farebrother, 11 Castle Road, Bayston Hill, Shrewsbury SY3 0NF; FAX (441-61) 275-4812]

July 27-30: Cambridge, England. Conference on Numerical Mathematics Celebrating the 60th Birthday of M. J. D. Powell. [MD Buhmann, Mathematics Dept, ETH Zentrum, CH-8092 Zürich; MDB@MATH.ETHZ.CH]

August 4-8: Chicago, Illinois. Joint Statistics Meetings: IMS (59th Annual Meeting), American Statistical Association (ASA) & International Biometric Society (ENAR/WNAR). Hyatt Regency. [ASA, 1429 Duke Street, Alexandria, VA 22314-3402; MEETINGS@ASA.MHS.COMPUSERVE.COM, FAX (1-703) 684-2037]

August 6-9: Scopporo, Japan. 3rd Workshop on Numerical Ranges & Numerical Radii. The Sapporo Guest House. [T Ando, Faculty of Economics, Hokusei Gakuen University, Atsubetsu-ku, Sapporo 004] See Image 14:42.

August 12–16: Jilin, China. 2nd China Matrix Theory Conference. Chinese Mathematical Society & Jilin Normal College. [Bit-Shun Tam, Dept of Mathematics, Tamkang University, Tamsui 25137, Taiwan; BSM01@HPAP.TKU.EDU.TW, FAX (886-2) 620-9916] See Image 15:16.

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]

August 26–29: Beijing, China. 3rd Gauss Symposium. [WA Rodrigues Jr., Division of Math & Theoretical Physics, Institutum Gaussianum, IMECC-UNICAMP, CP 6065, 13081-970 Campinas SP; WALROD@IME.UNICAMP.BR]

August 26-30: Barcelona, Spain. COMPSTAT96: 12th Symposium on Computational Statistics. Universitat Politecnica de Catalunya. [A Prat, Dept of Statistics, Universitat Politecnica de Catalunya, Avenida Diagonal 647, E-08028, Barcelona; (34-3) 401-6575, PRAT@EIO.UPC.ES]

1997

January 10-13: San Diego, California. Joint Mathematics Meetings: American Mathematical Society (AMS) & Mathematical Association of America (MAA). [H Daly, AMS, PO Box 6887, Providence, RI 02904-6887; MEET@MATH.AMS.ORG]

June 6-8: Winnipeg, Manifoba. International Linear Algebra Society (ILAS) Workshop on Fast Algorithms for Control, Signals and Image Processing. [P Lancaster, Dept of Mathematics, Univ of Calgary, Calgary, Alberta T2N 1N4; LAN-CASTER@ACS.UCALGARY.CA]

August 10-14: Ancheim, California. Joint Statistics Meetings: American Statistical Association (ASA) & International Biometric Society (ENAR/WNAR). Anaheim Hilton & Anaheim Marriott. [ASA, 1429 Duke Street, Alexandria, VA 22314-3402; FAX (1-703) 684-2037, MEETINGS@ASA.MHS.COMPUSERVE.COM]

August 18–27: Istanbul, Turkey. International Statistical Institute: 51st Biennial Session. [ISI Permanent Office, 428 Prinses Beatrixlaan, Postbus 950, NL-2270 AZ Voorburg; ISI@CS.VU.NL, FAX (31-70) 38-60025]

1998

January 10-13: Baltimore, Maryland. Joint Mathematics Meetings: American Mathematical Society (AMS) & Mathematical Association of America (MAA). [MEET@MATH.AMS.ORG; H Daly, AMS, PO Box 6887, Providence, RI 02904-6887]

June 3-6: Madison, Wisconsin. International Linear Algebra Society (ILAS) Conference. [RA Brualdi, Dept of Mathematics, Univ of Wisconsin, Van Vleck Hall, 480 Lincoln Drive, Madison, WI 53706-1388; FAX (1-608) 262-1402, BRUALDI@MATH.WISC.EDU]

August 9-13: Dallas, Texas. Joint Statistics Meetings: IMS (61st Annual Meeting), American Statistical Association (ASA) & International Biometric Society (ENAR/WNAR). Loews Anatole. [ASA, 1429 Duke Street, Alexandria, VA 22314-3402; FAX (1-703) 684-2037, MEETINGS@ASA.MHS.COMPUSERVE.COM]

1999

August: Helsinki, Finland. International Statistical Institute: 52nd Biennial Session. [ISI Permanent Office, 428 Prinses Beatrixlaan, Postbus 950, NL-2270 AZ Voorburg; FAX (31-70) 38-60025, ISI@CS.VU.NL]

August 8–12: Baltimore, Maryland. Joint Statistics Meetings: IMS (62nd Annual Meeting), American Statistical Association & International Biometric Society (ENAR/WNAR). [ASA, 1429 Duke Street, Alexandria, VA 22314-3402; FAX (1-703) 684-2037, MEETINGS@ASA.MHS.COMPUSERVE.COM]



PUBLISHERS Α K P E O F T SCIENCE E R S å TECHNOLOGY L T D

Mail, Phone, Fax or email your order today.

289 Linden Street Wellesley, MA 02181 USA

Tel: 617-235-2210 Fax: 617-235-2404 email: kpeters@geom.umn.edu MATlab and provide unique computer exercises, it also includes an accompanying diskette and tutorial as part of a complete educational package. I level of abstract algebra. Fundamentals of Abstract Analysis

Andrew Gleason 1991, 0-86720-209-2 Hardcover, \$59.95

Primarily intended for undergraduates at the stage where they first meet abstraction in mathematics. Combining a very formal approach with mathematical intuition, it gives a detailed exposition of basic set theoretic concepts and their relation to the field itself. With this unique approach, it attempts to bridge the widening intellectual gap between pure and applied mathematics. The result is a fundamental text for the serious student.

HarperCollinsMathematics

Tradition with Innovation

LINEAR ALGEBRA GATEWAY TO MATHEMATICS Robert Messer, Albion College

1994. 404 pages. Cloth. ISBN 0-06-501728-5.

This text resolves the conflict between the abstractions of linear algebra and the needs and abilities of the students who may have dealt only briefly with the theoretical aspects of previous mathematics courses.

Numerous discussions of the logical structure of proofs, the need to translate terminology into notation, and suggestions about efficient ways to discover a proof are featured. This book combines the many simple results of elementary linear algebra with some powerful computational techniques to demonstrate the theoretical mathematics need not be difficult, mysterious, or useless. The presentation of vector spaces as a common framework for geometry (lines and planes, angle and distance), algebra (linear equations), and calculus (spaces of functions), compartmentalizes the subject, rendering it easier to learn.

A FIRST COURSE IN LINEAR ALGEBRA second edition Hal G. Moore, Brigham Young University Adil Yaqub, University of California, Santa Barbara 1992. 493 pages. Cloth. 0-673-38392-X.

This text blends the requirements of problem-solving, analytical thinking, computational techniques, and applications needed for courses taken by the Introductory Linear Algebra student. The book includes a series of proofs designed to illustrate each theory; these are supported by comprehensive exercises designed to make students participants in the mathematic process.

PRIMER FOR LINEAR ALGEBRA *Stephen Demko, Georgia Institute of Technology* 1989. 192 pages. Paper. ISBN 0-673-38642-2.

To request an examination copy, call 1-800-828-6000. Bookstores may place orders through 1-800-PUB-BOOK

email: harperglenvw@delphi.com

For more information, contact your local HarperCollinsCollege sales representative.



Teaching and Learning Tools for the Evolving Linear Algebra Course!

New for 1996!

LINEAR ALGEBRA

Terry Lawson, Tulane University 30897-8, cloth, 1996

- Blends both computational and theoretical aspects of linear algebra, using each to enhance the other.
- Extensive collection of examples illustrate early treatment of basic linear algebra concepts.
- Embedded Exercises within the text help students check their understanding as they go, and End of Chapter Exercises deepen and extend knowledge.
- Substantial applications sections throughout motivate learning.
- Extensive supplementary material using software reinforce conceptual understanding.

Winner of a 1994 Texti— An Award for Excellence from the Textbook Authors Association, Inc.!

ELEMENTARY LINEAR ALGEBRA, Seventh Edition Howard Anton, Drexel University 58741-7, cloth, 1994

ELEMENTARY LINEAR ALGEBRA APPLICATIONS VERSION, Seventh Edition

Howard Anton, Drexel University Chris Rorres, Drexel University 58741-9, cloth, 1994

- Specifically crafted to fit the evolving linear algebra course.
- Develops a crescendo of theorems that links each new idea with the ideas that preceded it.
- Early development of basic concepts ensures students are exposed to the fundamentals of all major topics, even when time is tight.

- Includes more emphasis on visualization, especially the geometric aspects of rotations, projections and reflections in R^2 and R^3 .
- Includes new material on least squares and QRdecomposition as recommended by the Linear Algebra Curriculum Study Group.

Add the Flavor of Maple to Your Course!

LINEAR ALGEBRA WITH MAPLE

William Bauldry, Appalachian State University Jerry Johnson, University of Nevada, Reno Benny Evans, Oklahoma State University 06368-1, 1994

- Encourages and enables students to use Maple as an investigative tool to explore Linear Algebra concepts.
- Students are exposed to algebra concepts in four ways: numerically, graphically, symbolically and verbally.

And If You Prefer Derive....

LINEAR ALGEBRA WITH DERIVE

Benny Evans, Oklahoma State University Jerry Johnson, University of Nevada, Reno 59194-7, 1994

- Designed to help students use the Derive program as a tool to solve problems in the course.
- Provides unusual problems that encourage exploration and discovery.

For More Information

Email us at math@jwiley.com, or write to: John Wiley & Sons, Inc., attn. Debra Riegert, 605 Third Avenue, New York, New York 10158

LINEAR ALGEBRA

by H.M. Edwards, Courant Institute, NYU, NY



This text proposes a radically innovative approach to the linear algebra course, based on simple but powerful algorithms in matrix algebra. The basic material-matrix multiplication, solving a matrix equation AX=Y for X when A and Y are given, determinants, rank, zero devisors-is first developed in the case of matrices with integer entries using very elementary computational steps.

When the same methods are applied to matrices with rational entries, nothing changes, except that equations AX=Y have more solutions. When they are applied to matrices with polynomial entries they lead to algorithms for exploring the notion of similarity of square matrices of rational numbers, characteristic polynomials, mini-

mum polynomials, elementary devisors, rational canonical forms, and Jordan canonical form. The theory of Moore-Penrose pseudo-inverses—a powerful generalization of the method of least squares—is explained in a remarkably simple way.

The last chapter brings out the dependence of the spectral theorem on the non-algebraic notion of real numbers. It shows that the existence of a spectral representation of a symmetric matrix is equivalent to an algebraic property of the matrix and that over the real numbers every symmetric matrix has this property.

The algorithms on which the book is based are all explained in simple English, making it easy for instructors to implement them on whatever computer systems their students use or to teach the course without computers. Many exercises are provided, all with answers.

CONTENTS: Preface • Matrix Multiplication • Equivalence of Matrices-Reduction to Diagonal Form • Matrix Division • Determinants • Testing for Equivalence • Matrices with Rational Number Entries • The Method of Least Squares • Matrices with Polynomial Entries • Similarity of Matrices • The Spectral Theorem • Appendix: Linear Programming • Answers to Exercises • Index

1995 184 pp. Hardcover \$30.50 ISBN 0-8176-3731-1

Birkhäuser

Three Easy Ways to Order!

•CALL: Toll-Free 1-800-777-4643. In NJ please call 201-348-4033 or FAX 617-876-1272. Your reference number is Y921.

•WRITE: Birkhäuser, Marketing Dept. Y921, 675 Massachusetts Ave., Cambridge, MA 02139-3309.

• VISIT: Your local technical bookstore or urge your librarian to order for your department.

B

Prices are valid in North America only and are subject to change without notice. For price and ordering information outside North America, please contact Birkhäuser Verlag AG, P.O. Box 133, Klosterberg 23, CH-4010, Basel, Switzerland. Fax 41 61 271 7666.

TEXTBOOK ADOPTION POLICY

To request an examination copy, please send your request on departmental letterhead and include the name of your course and current text, estimated class size, and the adoption decision date. Send adoption examination requests to: Birkhäuser, Marketing Dept. Y921, 675 Massachusetts Ave., Cambridge, MA 02139-3309.

Prentice Hall Linear Algebra



Elementary Linear Algebra, Sixth Edition

Bernard Kolman, Drexel University

Blending an introduction to proof, abundant applications, and superb problem sets, the new edition of this classic features more geometric explanations, new problems, new sections on orthogonal compliments, and computer graphics throughout.

© 1996, 576 pp., cloth (0-13-374729-8)

The Student Edition of MATLAB®, Version 4

The MathWorks, Inc.

The Student Edition of MATLAB®, Version 4 is a revision of the best-selling student edition of this industry standard software tool. It puts over 500 mathematical, statistical, scientific, and engineering functions at students' fingertips. A limited version of the professional software, this edition allows users to perform matrix manipulations, numerical computations, symbolic operations (based on MAPLE V® software), scientific visualization, and data analysis in a quick and easy-to-use fashion.

© 1995, (WIN 0-13-184995-6) (MAC 0-13-184987-5) (Book only 0-13-184979-4)

Linear Algebra Labs with MATLAB®

David R. Hill and David E. Zitarelli, both of Temple University

This is the first—and currently the only—text specifically designed for use with MATLAB® in the computer lab section of a linear algebra or matrix algebra course. Using a variety of class-tested exercises and the "discovery" method, the labs reinforce key concepts and provide opportunities for experimentation and discussions of algebraic and geometric relationships where appropriate.

© 1994, 350 pp., paperback (0-02-354811-8)

Linear Algebra with Applications, Fourth Edition

Steven J. Leon, University of Massachusetts, Dartmouth

A thorough and distinctively accessible treatment of linear algebra, this text covers all the topics listed in the core syllabus for the matrix-oriented linear algebra course that has been recommended by the Linear Curriculum Study Group (LACSG). The Fourth Edition now includes several key organizational refinements that make it even more user-friendly and new exercises and examples integrated throughout. © 1994, 511 pp., cloth (0-02-369831-4)

Linear Algebra: An Introduction to the Theory and the Use of Vectors and Matrices Alan Tucker, State University of New York at Stony Brook

Written for sophomore linear algebra and applied linear algebra students, this text covers the fundamental role of linear algebra within both pure and applied mathematics, as well as client disciplines such as engineering, the physical sciences, and economics.

© 1994, 570 pp., cloth (0-02-421581-3)

Linear Algebra, Second Edition

Stephen H. Friedberg, Arnold J. Insel and Lawrence E. Spence, all of Illinois State University

This book presents a careful treatment of the principal topics of linear algebra and illustrates the power of the subject through a variety of applications. Beginning with vector spaces and basic theory, this text makes a smooth progression to such subjects as unitary transformations and canonical forms. © 1989, 528 pp., paperback (0-13-537102-3)

Ordering Information—To order an examination copy for course adoption consideration, please contact your local Prentice Hall representative or our Faculty Services Group at (800) 526-0485. For single copy orders call Neodata at (800) 374-1200. In Canada, please contact: Prentice Hall Canada-College Division, 1870 Birchmount Road, Scarborough Ontario M1P 2J7, (416) 293-3621, fax (416) 299-2539.



Who is this gentleman?

Is his book on Linear Algebra, published in 1882, the first book ever published on Linear Algebra?