

**The Seventh International Workshop on
Matrices and Statistics, in Celebration of
T. W. Anderson's 80th Birthday
Fort Lauderdale, Florida, USA: December 11–14, 1998**

Workshop Programme with Abstracts

The Seventh International Workshop on Matrices and Statistics, in celebration of T. W. Anderson's 80th birthday, is held at Nova Southeastern University (NSU), Fort Lauderdale, Florida, USA, December 11–14, 1998. The lectures are presented in rooms 2101 and 2102 of the Terry Building, in the NSU Health Professions Division, 3200 South University Drive. This Workshop is co-sponsored by Nova Southeastern University, the Statistical Society of Canada (SSC), and the International Linear Algebra Society (ILAS).

This Workshop is the seventh in an ongoing series. The six previous Workshops were held as follows:

- (1) Tampere, Finland: August 1990, (2) Auckland, New Zealand: December 1992, (3) Tartu, Estonia: May 1994, (4) Montréal, Canada: July 1995, (5) Shrewsbury, England: July 1996, (6) İstanbul, Turkey: August 1997.

The Eighth International Workshop on Matrices and Statistics will be held at the University of Tampere, Tampere, Finland: Friday, August 6, and Saturday, August 7, 1999.

Local Organizing Committee at Nova Southeastern University

Naomi D'Alessio, William D. Hammack, David S. Simon, and Fuzhen Zhang (chair).

International Programme and Organizing Committee

R. William Farebrother (Victoria Univ. of Manchester, England), Simo Puntanen (Univ. of Tampere, Finland), George P. H. Styan (McGill Univ., Canada; chair) & Hans Joachim Werner (Univ. of Bonn, Germany; vice-chair).

Sessions are coded by the triple: JKL where J = A (Saturday), J = B (Sunday), J = C (Monday); K = X (First time period), K = Y (Second time period); L = 1 (Room 2101), L = 2 (Room 2102).

All plenary sessions will be held in Room 2101.

Programme for Saturday, December 12, 1998	page 2
Programme for Sunday, December 13, 1998	page 4
Programme for Monday, December 14, 1998	page 6
Papers Presented as Posters	page 7
Papers Presented by Title	page 7
Abstracts	page 8
Some Problems from the IMAGE Problem Corner	page 31
Workshop Author Index	page 32

This publication, including the final camera-ready copy, was prepared in the Institute for Econometrics and Operations Research, Econometrics Unit, University of Bonn, by Hans Joachim Werner, with assistance from Shane T. Jensen and George P. H. Styan, in the Dept. of Mathematics and Statistics, McGill University, Montréal.

Printed by the Copy Center of Nova Southeastern University · Printed in the USA

Saturday, December 12, 1998

09:00–09:30, Welcome and Opening Remarks: Room 2101

09:30–12:15, Plenary Session A: Room 2101

Chair: George P. H. STYAN (*McGill University, Montréal*)

- 09:30** Knut CONRADSEN* (*Technical University of Denmark, Lyngby*), Bjarne Kjær ERSBØLL (*Technical University of Denmark, Lyngby*) and Allan Aasbjerg NIELSEN (*Technical University of Denmark, Lyngby*): Anderson's 1958 Multivariate Statistics Monograph and Image Analysis [A-13]
- 10:00** John S. CHIPMAN (*University of Minnesota, Minneapolis*): Anderson and Rubin's Limited-Information Maximum-Likelihood Method Revisited: Generalization to Arbitrary Linear Restrictions [A-12]
- 10:30 Morning Coffee Break**
- 11:00** Michael A. STEPHENS (*Simon Fraser University, Burnaby, BC*): The Anderson-Darling Statistic [A-55]
- 11:30** Theodore W. ANDERSON (*Stanford University*): Estimation of Reduced Rank Regression [A-4]

12:15–12:30, Group Photograph

12:30–14:00, Lunch Break

14:00–15:30, Parallel Session AX1: Room 2101

Chair: Bernhard D. FLURY (*Indiana University, Bloomington*)

- 14:00** Gülhan ALPARGU* (*McGill University, Montréal*) and George P. H. STYAN (*McGill University, Montréal*): Our Favourite Proof of and a Bibliography on the Frucht-Kantorovich Inequality [A-2]
- 14:15** Shane T. JENSEN* (*McGill University, Montréal*) and George P. H. STYAN (*McGill University, Montréal*): Some Comments and a Bibliography on the Laguerre-Samuelson Inequality, with Extensions and Applications in Statistics and Matrix Theory [A-31]
- 14:30** Natália BEBIANO (*Universidade de Coimbra*): Spectral Inequalities in Statistical Mechanics [A-5]
- 14:45** Jorma K. MERIKOSKI* (*University of Tampere*), Ari VIRTANEN (*University of Tampere*) and Suvi KARVONEN (*University of Tampere*): On Symmetrizations of Nonnegative Matrices [A-41]
- 15:00** Yongge TIAN* (*Concordia University, Montréal*) and George P. H. STYAN (*McGill University, Montréal*): Rank Equalities Related to Generalized Inverses of Matrices and Their Applications [A-60]
- 15:15** Jürgen GROß (*University of Dortmund*): On the Product of Orthogonal Projectors [A-22]

14:00–15:30, Parallel Session AX2: Room 2102Chair: David A. HARVILLE (*IBM Thomas Watson Research Center, Yorktown Heights, NY*)

- 14:00** Peter ŠEMRL (*University of Ljubljana*): Finite Rank Elements in Banach Algebras [A-53]
- 14:15** George DAVIS (*Georgia State University, Atlanta*), Frank J. HALL (*Georgia State University, Atlanta*), Zhongshan LI* (*Georgia State University, Atlanta*) and Di WANG (*Georgia State University, Atlanta*): Inertias of Matrices with Specified Sign Patterns [A-35]
- 14:30** James V. BONDAR (*Carleton University, Ottawa*): On Power Functions for MANOVA [A-7]
- 14:45** Nancy FLOURNOY (*American University, Washington, DC*): Markov Chain Matrices Arising from Randomized Ehrenfest Urn Designs [A-20]
- 15:00** Attahiru Sule ALFA (*University of Manitoba, Winnipeg*), Jungong XUE (*Fudan University, Shanghai*) and Qiang YE* (*University of Manitoba, Winnipeg*): Perturbations and Accurate Computations for Diagonally Dominant M -matrices with Applications to $GI/M/1$ Type Markov Chains [A-73]
- 15:15** Erkki P. LISKI* (*University of Tampere*), Arto LUOMA (*University of Tampere*) and Alexander ZAIGRAYEV (*Nicholas Copernicus University of Toruń*): Properties of Distance Optimality Design Criterion for Linear Regression Models [A-36]

15:30–16:00, Afternoon Tea Break**16:00–17:30, Parallel Session AY1: Room 2101**Chair: Júlia VOLAUFOVÁ (*Louisiana State University, Baton Rouge*)

- 16:00** Vesna OMLADIČ* (*University of Ljubljana*) and Matjaž OMLADIČ (*University of Ljubljana*): More on Restricted Canonical Correlations [A-44]
- 16:15** Imbi TRAAAT (*University of Tartu*): On the Covariance Matrix and Dependency Vector of the Sampling Design [A-61]
- 16:30** Kai-Tai FANG (*Hong Kong Baptist University*) and Tõnu KOLLO* (*University of Tartu*): Exact F-Tests and Distribution of Eigenvectors [A-33]
- 16:45** Yoshio TAKANE* (*McGill University, Montréal*) and Haruo YANAI (*National Center for University Entrance Examination, Tokyo*): Two New Decompositions of Orthogonal Projectors Useful in Canonical Correlation Analysis [A-58]
- 17:00** Jürgen GROß (*University of Dortmund*) and Götz TRENKLER* (*University of Dortmund*): The Equality Between Linear Transforms of Ordinary Least Squares and Best Linear Unbiased Estimator [A-62]
- 17:15** Tonghui WANG (*New Mexico State University, Las Cruces*): An Alternative Proof for a Version of Cochran's Theorem under Elliptical Settings [A-68]

16:00–17:30, Parallel Session AY2: Room 2102Chair: Lynn Roy LaMOTTE (*Louisiana State University, Baton Rouge*)

- 16:00** Gerald E. SUBAK-SHARPE* (*City College of New York*) and George P. H. STYAN (*McGill University; Montréal*):
On the Characterization of Positive Resistance Networks by means of Distance Geometry [A-57]
- 16:15** Michel VAN DE VELDEN* (*Universiteit van Amsterdam*) and Heinz NEUDECKER (*Universiteit van Amsterdam*):
On an Eigenvalue Property Relevant in Correspondence Analysis and Related Methods [A-63]
- 16:30** Marianna PENSKY (*University of Central Florida, Orlando*):
Nonparametric Empirical Bayes Estimation of the Matrix Parameter of the Wishart Distribution [A-45]
- 16:45** Yijun ZUO* (*Arizona State University, Tempe*) and Robert J. SERFLING (*University of Texas at Dallas*):
Nonparametric Notions of Multivariate “Scatter Measure” and “More Scattered” Based on
Statistical Depth Functions [A-75]
- 17:00** Nidia HERNÁNDEZ (*Autonomous University of Coahuila*):
Discrimination under Normality with Certain Irregularities in Sample Dispersion Matrices [A-29]
- 17:15** Philip V. BERTRAND (*Sheffield Hallam University*):
Constructing Multiple Regression Data with a Specified Covariance Matrix [A-6]

19:00 Saturday Night Banquet

Waterfall Café at the Rolling Hills Hotel & Golf Resort, 3501 West Rolling Hills Circle, Fort Lauderdale;
tel. 1-800-327-7735 or (1-954) 475-0400.

Sunday, December 13, 1998

09:00–12:30, Plenary Session B: Room 2101Chair: Hans Joachim WERNER (*University of Bonn*)

- 09:00** C. Radhakrishna RAO (*The Pennsylvania State University, University Park*):
Statistical Solutions of Some Matrix Problems [A-50]
- 09:30** James DURBIN (*London, England*): Matrices in State Space Methods for Time Series Analysis [A-16]
- 10:00** Ingram OLKIN (*Stanford University*): Distribution of Functions of Random Normal Matrices [A-43]
- 10:30** Morning Coffee Break
- 11:00** Friedrich PUKELSHEIM (*University of Augsburg*): The Kiefer Partial Order for the Design of Experiments:
A Superposition of Matrix Majorization and the Löwner Ordering [A-47]
- 11:30** Friedhelm EICKER (*University of Dortmund*): Some Results on Regression Design Matrices [A-17]
- 12:00** William E. WATKINS (*California State University, Northridge*): D-Optimal Weighing Designs [A-69]

12:30–14:00, Lunch Break

14:00–15:40, Parallel Session BX1: Room 2101Chair: Friedrich PUKELSHEIM (*University of Augsburg*)

- 14:00** Yasuo AMEMIYA (*Iowa State University*):
Improved Estimation of Parameters in Structural Equation Analysis [A-3]
- 14:25** Bimal K. SINHA (*University of Maryland, Baltimore County*):
Meta-Analysis: Combining Independent Tests [A-54]
- 14:50** Hrishikesh D. VINOD (*Fordham University, Bronx*):
Foundations of Multivariate Inference Using Modern Computers [A-65]
- 15:15** R. William FAREBROTHER (*Victoria University of Manchester*):
Mechanical Models for Categorical Data Analysis [A-18]

14:00–15:40, Parallel Session BX2: Room 2102Chair: William E. WATKINS (*California State University, Northridge*)

- 14:00** Frank J. HALL* (*Georgia State University, Atlanta*) and Zhongshan LI (*Georgia State University, Atlanta*):
Sign Patterns of Idempotent Matrices [A-24]
- 14:25** Robert E. HARTWIG* (*North Carolina State University, Raleigh*) and K. Manjunatha PRASAD
(*Manipal Institute of Technology, Gangtok, Sikkim*): Brahma and Shiva in Matrix Theory [A-26]
- 14:50** Shayle R. SEARLE (*Cornell University, Ithaca*):
Comments from Thirty Years of Teaching Matrix Algebra to Applied Statisticians [A-52]
- 15:15** Bernhard D. FLURY (*Indiana University, Bloomington*): Allometric Extension [A-21]

15:40–16:00, Afternoon Tea Break**16:00–17:30, Parallel Session BY1: Room 2101**Chair: Bimal K. SINHA (*University of Maryland, Baltimore County*)

- 16:00** Júlia VOLAUFOVÁ (*Louisiana State University, Baton Rouge*):
On Variance of Two-Stage Estimator in Mixed Linear Model [A-66]
- 16:15** Lynn Roy LaMOTTE* (*Louisiana State University, Baton Rouge*) and Ovidiu ROMANOSCHI
(*Louisiana State University, Baton Rouge*): Regression Diagnostics via “Collapsibility” [A-34]
- 16:30** N. R. CHAGANTY* (*Old Dominion University, Norfolk*) and D. N. NAIK (*Old Dominion University, Norfolk*):
Analysis of Multivariate Longitudinal Data [A-9]
- 16:45** Berthold HEILIGERS (*University of Magdeburg*): Experimental Design for Polynomial Spline Regression: Spectral
Properties of Information Matrices [A-28]
- 17:00** Augustyn MARKIEWICZ (*Agricultural University of Poznań*):
Linear Sufficiency and Admissibility in an Incorrectly Specified Restricted Linear Model [A-40]
- 17:15** Albert SATORRA* (*Universitat Pompeu Fabra, Barcelona*) and Heinz NEUDECKER (*University of Amsterdam*):
A Matrix Equality Useful in GLS Analysis of Augmented Moment Structures [A-51]

16:00–17:15, Parallel Session BY2: Room 2102Chair: Christopher C. PAIGE (*McGill University, Montréal*)

- 16:00** Xiao-Wen CHANG* (*McGill University, Montréal*) and Christopher C. PAIGE (*McGill University, Montréal*):
On the Accuracy of the QR Factorization [A-10]
- 16:15** Valia GUERRA ONES (*Group of Numerical Methods, Vedado, Habana, Cuba*): Maximum Balance Criterion for
Choosing the Parameter Lambda in the Minimal Pseudoinverse Methods [A-23]
- 16:30** André KLEIN* (*University of Amsterdam*) and Peter SPREIJ (*Vrije Universiteit Amsterdam*):
Some Resultant Properties of Fisher's Information Matrix of Multivariate Time Series ARMA Models [A-32]
- 16:45** Heinrich VOSS (*Technical University of Hamburg–Harburg*):
Bounds for the Minimum Eigenvalue of a Real Symmetric Toeplitz Matrix [A-67]
- 17:00** Steve K. HALITSKY* (*SPR Inc., Oak Brook, IL*) and Andrey HALITSKY (*SPR Inc., Oak Brook, IL*):
The Numerical Analysis of Closeness Measures for Positively-Defined Multi-Variate System [A-24]

Monday, December 14, 1998

09:00–11:30, Plenary Session C: Room 2101Chair: Simo PUNTANEN (*University of Tampere*)

- 09:00** Michael D. PERLMAN* (*University of Washington, Seattle*) and Lang WU (*University of Seattle, Washington*):
The Emperor's New Tests: A Defense of the Likelihood Ratio Criterion [A-46]
- 09:25** David A. HARVILLE (*IBM Thomas J. Watson Research Center, Yorktown Heights*):
Simple Derivations for Two Jacobians of Basic Importance in Multivariate Statistics [A-27]
- 09:50** Haruo YANAI (*National Center for University Entrance Examinations, Tokyo*): Generalized Canonical Correlation
Analysis of Variables Associated with G-inverse of the Dispersion Matrix of m Sets of Variables [A-72]
- 10:15 Morning Coffee Break**
- 10:40** Theophilos CACOULLOS (*University of Athens*):
On Testing Homoscedasticity via Independence under Joint Normality [A-8]
- 11:05** Hans Joachim WERNER (*University of Bonn*):
On BLUEs, BLIMBEs, BLUPs, BLIMBIPs and Dispersion Matrix Decompositions [A-71]

11:30–13:00, Lunch Break**14:00–17:00, Monday Afternoon Cruise****19:00–23:00, Monday Evening Gourmet Dinner (smoke-free)**

Armadillo Café, 4630 S. W. 64th Avenue, Davie, Florida; tel. (954) 791-4866.

Papers Presented as Posters

- Gülhan ALPARGU* (*McGill University, Montréal*) and Pierre DUTILLEUL (*McGill University, Montréal*):
Matrices in Statistical Procedures for Valid Hypothesis Testing in Regression Models with Autocorrelated Errors [A-1]
- Pinyuen CHEN* (*Syracuse University*) and Michael C. Wicks (*US Air Force Research Laboratory, Rome*):
On Comparing Two Covariance Matrices [A-11]
- Carles M. CUADRAS (*Universitat de Barcelona*):
Correspondence Analysis and Diagonal Expansions in Terms of Distribution Functions [A-14]
- Mylène DUMAIS* (*McGill University, Montréal*) and George P. H. STYAN (*McGill University, Montréal*):
A Bibliography on the Distribution of Quadratic Forms in Normal Variables,
with Special Emphasis on the Craig-Sakamoto Theorem and on Cochran's Theorem [A-15]
- R. William FAREBROTHER (*Victoria University of Manchester*), Shane T. JENSEN (*McGill University, Montréal*) and
George P. H. STYAN* (*McGill University, Montréal*): Some Remarks on Five Mathematicians and on at least
Three Postage Stamps associated with Determinants [A-56]
- Jürgen GROß (*University of Dortmund*) and Simo PUNTANEN* (*University of Tampere*):
Estimation under a General Partitioned Linear Model [A-48]
- Asmaâ MANSOUR* (*McGill University, Montréal*), François BELLAVANCE (*University of Montréal*) and
Martin COLE (*McGill University, Montréal*):
Modeling Effect Size Estimates in Meta-Analysis Using Fixed and Mixed Effects Linear Models [A-39]
- Tapio NUMMI* (*University of Tampere*) and Jyrki MÖTTÖNEN (*University of Tampere*):
On the Analysis of Multivariate Growth Curves [A-42]
- Simo PUNTANEN* (*University of Tampere, Tampere*) and George P. H. STYAN (*McGill University, Montréal*):
A Third Guide to Books on Matrices and Books on Inequalities, with Statistical and Other Applications [A-49]
- Yongge TIAN (*Concordia University, Montréal*): On the Solvability of Some Linear Matrix Equations [A-59]
- Humberto VAQUERA-HUERTA* (*Colegio de Posgraduados, Texcoco*) and Jose VILLASENOR (*Colegio de Posgraduados,
Texcoco*): On the Generalized Pareto Regression Model [A-64]
- Fuzhen ZHANG (*Nova Southeastern University, Fort Lauderdale*):
Some Matrix Inequalities on Principal Submatrices of Positive Semidefinite Matrices [A-74]
-

Papers Presented by Title

- James A. FILL (*Johns Hopkins University, Baltimore*) and Donniell E. FISHKIND (*Univ. of Southern Maine, Portland*):
The Moore-Penrose Generalized Inverse for Sums of Matrices [A-19]
- Erin M. HODGESS (*University of Houston*):
Temporal Disaggregation for Differenced Bivariate Time Series [A-30]
- Shuangzhe LIU (*University of Basel*):
Inequalities involving Hadamard Products of Positive Semidefinite Matrices [A-37]
- Shuangzhe LIU (*University of Basel*):
Local Influence in Multivariate Elliptical Linear Regression Models [A-38]
- Hele-Liis VIIRSALU (*University of Tartu*) and Ene-Margit TIIT (*University of Tartu*):
Multivariate Dependence Structures Described via C -correlation Matrices [A-76]
- Yimin WEI (*Fudan University, Shanghai*):
Perturbation for the Weighted Moore-Penrose Inverse [A-70]