

# CONTENTS

## THE LIFE AND WORKS OF CORNELIUS LANCZOS

- xvii A Photographic Essay
- xxi Cornelius Lanczos: A Biographical Essay  
*Barbara Gellai*
- xlix Cornelius Lanczos (1893-1974), and the Hungarian Phenomenon in Science and Mathematics  
*Peter D. Lax*
- liii The Roots of Cornelius Lanczos  
*George Marx*
- lviii Reminiscences of Cornelius Lanczos  
*Jon Todd*
- lx Published Papers and Books of Cornelius Lanczos

## PLENARY PRESENTATIONS: COMPUTATIONAL MATHEMATICS

- 3 Lanczos and the FFT: A Discovery Before its Time  
*James W. Cooley*
- 11 Lanczos Algorithms for Large Scale Symmetric and Nonsymmetric Matrix Eigenvalue Problems  
*Jane K. Cullum*
- 33 The Look-Ahead Lanczos Process for Nonsymmetric Matrices and its Applications  
*Roland W. Freund*
- 49 The Lanczos and Conjugate Gradient Algorithms in Finite Precision Arithmetic  
*Anne Greenbaum*
- 61 The Lanczos Process and Padé Approximation  
*Martin H. Gutknecht*
- 77 The Tau Method and the Numerical Solution of Differential Equations:  
Past Research and Recent Research  
*Eduardo L. Ortiz*
- 83 Krylov Subspace Processes, Krylov Subspace Methods, and Iteration Polynomials  
*C.C. Paige*
- 93 Do We Fully Understand the Symmetric Lanczos Algorithm Yet?  
*Beresford N. Parlett*

- 109 On Generalized Band Matrices and Their Inverses  
*Pál Rósa, Francesco Romani, and Roberto Bevilacqua*
- 123 Theoretical Error Bounds and General Analysis of a Few Lanczos-Type Algorithms  
*Youcef Saad*
- 135 Lanczos and Linear Systems  
*G.W. Stewart*

PLENARY PRESENTATIONS:  
THEORETICAL PHYSICS AND ASTROPHYSICS

- 143 Integration on the Space of Connections Modulo Gauge Transformations  
*Abhay Ashtekar, Donald Marolf, and José Mourão*
- 161 Quasiclassical Domains in a Quantum Universe  
*James B. Hartle*
- 173 Gauge Invariant Energy-Momentum Tensor in Spinor Electrodynamics  
*D. Petiot and Y. Takahashi*
- 187  $\gamma$ -Ray Bursts and Neutron Star Mergers  
*Tsvi Piran*
- 201 Lanczos's Early Contributions to Relativity and His Relationship with Einstein  
*John Stachel*
- 223 Topological Roots of Black Hole Entropy  
*Claudio Teitelboim*
- 231 Variational Principles, Local Symmetries, and Black Hole Entropy  
*Robert M. Wald*

MATHEMATICS MINISYMPOSIA

- 241 Eigenvalue Computations: Theory and Algorithms
- 249 Eigenvalue Computations: Applications
- 265 Moments in Numerical Analysis
- 277 Iterative Methods for Linear Systems
- 301 Least Squares
- 311 Software for Lanczos-based Algorithms
- 335 Tau Method
- 357 Chebyshev Polynomials
- 375 Lanczos Methods in Control and Signal Processing
- 393 Development of the FFT

399 The FFT in Signal Processing

411 Wavelets

## PHYSICS MINISYMPOSIA

431 Computational Magnetohydrodynamics in Astrophysics

453 Numerical Simulations of Collisionless Space Plasmas

477 Detection of Gravitational Radiation from Astrophysical Sources

489 Lanczos H-tensor

513 Cosmic Censorship

527 Cauchy Problem of General Relativity

543 Black Hole Evaporation and Thermodynamics

555 The Problem of Time in Quantum Gravity

571 New Variables and Loop Quantization

589 Decoherence and the Foundations of Quantum Mechanics

603 Open Questions in Particle Theory

621 Supercollider Physics

633 Symplectic Methods in Physics