

# CONTENTS

<i>Contributors</i>	<i>xiii</i>
<i>Preface</i>	<i>xxi</i>
<i>Honoring Professor Lamberto Cesari</i>	<i>xxiii</i>

## INVITED ADDRESSES AND RESEARCH REPORTS

Group Properties of $u_{tt} = [f(u)u_x]_x$	1
<i>E. Adams, W. F. Ames, and R. J. Lohner</i>	
Perturbation and Bifurcation in a Discontinuous Nonlinear Eigenvalue Problem	7
<i>Roger K. Alexander and Bernard A. Fleishman</i>	
A Singular Fourier Problem with Nonlinear Boundary Condition	13
<i>Vasilios Alexiades and C. Y. Chan</i>	
Diversity and Spatial Effects on Competitive Systems	15
<i>Linda J. Allen and Thomas G. Hallam</i>	
A Bang-Bang Type Theorem for Measures	25
<i>R. A. Aló, T. Alvager, A. de Korvin, and G. Graham</i>	
Some Optimal Control Problems for the Helmholtz Equation	31
<i>Thomas S. Angell</i>	
Stability of a Large Flexible Beam in Space	39
<i>B. A. Asner, Jr.</i>	
Some Constructions in Semi-Dynamical Systems	41
<i>Prem N. Bajaj</i>	
Identification of Nonlinear Delay Systems Using Spline Methods	47
<i>H. T. Banks</i>	
Parameter Estimation Techniques for Nonlinear Distributed Parameter Systems	57
<i>H. T. Banks and K. Kunisch</i>	
Projection Techniques for Nonlinear Elliptic PDE	69
<i>J. Baranger</i>	

An Operational Equation Arising in Synthesis of Optimal Control <i>V. Barbu and G. Da Prato</i>	79
The Problem of Graffi–Cesari <i>Piero Bassanini</i>	87
A Variational Approach to Solving Semilinear Equations at Resonance <i>Peter W. Bates</i>	103
Exchange of Stability and Hopf Bifurcation <i>Stephen R. Bernfeld</i>	113
Monotone Method for Nonlinear Boundary Value Problems by Linearization Techniques <i>Stephen R. Bernfeld and V. Lakshmikantham</i>	117
Existence and Uniqueness of Solutions to Nonlinear-Operator-Differential Equations Generalizing Dynamical Systems of Automatic Spaceship Navigation <i>Victor M. Bogdan</i>	123
A Numerical Method for a Free Surface Density-Driven Flow <i>V. Bulgarelli, V. Casulli, and D. Trigante</i>	137
Vortex Motions and Their Stability <i>Jacob Burbea</i>	147
The Hamilton–Jacobi Equation with an Unbounded Inhomogeneity <i>B. Clay Burch and Jerome A. Goldstein</i>	159
Finite Difference Methods for Identification of Hereditary Control Systems <i>J. A. Burns</i>	169
Models of Vertically Transmitted Diseases with Sequential-Continuous Dynamics <i>Stavros Busenberg and Kenneth L. Cooke</i>	179
Vertically Transmitted Diseases <i>Kenneth L. Cooke and Stavros Busenberg</i>	189
A Stochastic Compartmental Model of Preinfarction Angina <i>B. Canada and J. Eisenfeld</i>	199
A Nonlinear Diffusion System Modelling the Spread of Oro-Faecal Diseases <i>Vincenzo Capasso and Lucia Maddalena</i>	207
Existence of Solutions of Hyperbolic Problems <i>Lamberto Cesari</i>	219
Applications of Differential Inequalities to Gas Lubrication Theory <i>Jagdish Chandra and Paul Wm. Davis</i>	235
Comparison Principle and Theory of Nonlinear Boundary Value Problems <i>J. Chandra, V. Lakshmikantham, and S. Leela</i>	241
Differential Equations with Discontinuous Nonlinearities <i>Kung-Ching Chang</i>	249

An Estimate for the Solution of a Certain Functional Differential Equation of Neutral Type	255
<i>E. N. Chukwu</i>	
A Semidiscretization Procedure for Fitzhugh–Nagumo Equations	269
<i>C. Corduneanu and V. Dougalis</i>	
Bifurcation of Periodic Solutions of Nonlinear Equations in Age-Structured Population Dynamics	279
<i>J. M. Cushing</i>	
Conservation Laws with Dissipation	289
<i>C. M. Dafermos</i>	
On Fixed Points of Multivalued Maps	295
<i>K. M. Das</i>	
Bifurcation of Stable Periodic Solutions for Periodic Quasilinear Parabolic Equations	301
<i>Piero de Mottoni and Andrea Schiaffino</i>	
Continuity of Weak Solutions to Certain Singular Parabolic Equations	307
<i>Emmanuele Di Benedetto</i>	
A Problem Arising in the Mathematical Theory of Epidemics	313
<i>Gabriella Di Blasio</i>	
A Collinear $n$ -Body Problem of Classical Electrodynamics	329
<i>R. D. Driver and M. J. Norris</i>	
On Qualitative Properties of Nonlinear Compartmental Systems	335
<i>Sen-Wo Du and Jerome Eisenfeld</i>	
The Asymptotic Form of Nonoscillatory Solutions to Fourth-Order Equations	343
<i>Allan L. Edelson</i>	
Identification of Nonlinear Compartmental Systems with an Application to the Modelling of the Enzyme Cytochrome P-450	351
<i>Jerome Eisenfeld, Julian A. Peterson, Lynn Peterson, and Keith Tuttle</i>	
Some Applications of Hadamard's Inverse Function Theorem	363
<i>Alan Elcrat</i>	
Comparison Theorems for Riccati Differential Equations in a $B^*$ -Algebra	371
<i>L. Erbe and S. Mysore</i>	
Oscillations Periodiques des Systemes Mecaniques Non Lineaires Excitees par des Distributions $\delta$ (Percussions) ou $\delta'$	379
<i>Robert Faure</i>	
Representation and Asymptotic Behavior of Strongly Damped Evolution Equations	389
<i>W. E. Fitzgibbon</i>	
Degree Theoretic Methods in Optimal Control	397
<i>R. E. Gaines and J. W. Peterson</i>	

A Galerkin Numerical Method for a Class of Nonlinear Reaction-Diffusion Systems	401
<i>Luciano Galeone and Luciano Lopez</i>	
On a Semi-Coercive Quasi-Variational Inequality	419
<i>Maria Giovanna Garroni and Jean-Pierre Gossez</i>	
A Threshold Model of Antigen Antibody Dynamics with Fading Memory	425
<i>J. A. Gatica and Paul Waltman</i>	
One Phenomenon in Nonlinear Oscillations	441
<i>A. Gelman</i>	
Two Fixed Point Principles	445
<i>A. Gelman</i>	
Cheap Shooting Methods for Self-Adjoint Problems Using Initial Value Methods	451
<i>Charles Gibson and John Gregory</i>	
On Entire Solutions in Some Nonlinear Fourth-Order Elliptic Equations	463
<i>Vinod B. Goyal and Philip W. Schaefer</i>	
On the Existence of Large Amplitude Plane-Polarized Alfvén Waves	469
<i>A. T. Granik</i>	
Direct Computer Simulation of Nonlinear Waves in Solids, Liquids, and Gases	471
<i>Donald Greenspan</i>	
Functional Equations of Fredholm-Type and Nonlinear Boundary Value Problems	483
<i>Chaitan P. Gupta</i>	
On Structural Identification	491
<i>Glen Haddock and C. C. Travis</i>	
Recent Results for Wave Equations of Rayleigh and Van der Pol Type	497
<i>William S. Hall</i>	
Group Theoretical Methods and the Nonlinear Schrödinger Equation	507
<i>J. Harnad and P. Winternitz</i>	
Small Deviations from Symmetry in Models in Population Biology	513
<i>Alan Hastings</i>	
Controllability of Systems which Generate Solvable Lie Algebras and the Associated Problems in Nonlinear Functional Analysis	517
<i>H. Hermes</i>	
Positive Solutions of Reaction-Diffusion Systems with Nonlinear Boundary Conditions and the Fixed Point Index	525
<i>Jesús Hernández</i>	
On Bifurcation from Infinity for Positive Solutions on Second-Order Elliptic Eigenvalue Problems	537
<i>Peter Hess</i>	

The Principle of Biological Equivalence and Mathematical Modeling in Physiology <i>John A. Jacquez</i>	545
A Class of Conservative Methods for the Numerical Solution of Multiphase Stefan Problems <i>P. Jamet</i>	561
Conjugates of Differential Flows II <i>Gordon G. Johnson</i>	569
Properties of Solutions of Nonlinear Partial Differential Equations Using Finite Element Methods <i>John Jones, Jr.</i>	579
An Approximation Scheme for Delay Equations <i>F. Kappel</i>	585
The Center of a Transformation Group <i>Ronald A. Knight</i>	597
<i>A Priori</i> Bounds in Nonlinear Shell Theory <i>George H. Knightly and D. Sather</i>	601
The Riccati Integral Equation Arising in Optimal Control of Delay Differential Equations <i>K. Kunisch</i>	611
Existence and Asymptotic Behavior of Reaction-Diffusion Systems via Coupled Quasi-Solutions <i>G. S. Ladde, V. Lakshmikantham, and A. S. Vatsala</i>	619
Emergence of Periodic and Nonperiodic Motions in a Burgers' Channel Flow Model <i>Jon Lee</i>	629
Nonhomogeneous Boundary Conditions for Generalized Ordinary Differential Subspaces <i>Sung J. Lee</i>	643
Weak Continuity and Compactness of Nonlinear Operators <i>Leonard J. Lipkin</i>	651
Asymptotic Behavior of the Renewal Equation Arising in the Gurtin Population Model <i>Pierangelo Marcati</i>	655
Asymptotic Behavior for a Strongly Damped Nonlinear Wave Equation <i>Paul Massatt</i>	663
Nonlinear Functional Analysis and Periodic Solutions of Semilinear Wave Equations <i>Jean Mawhin</i>	671
On Some Semilinear Problems without Compactness <i>P. J. McKenna</i>	683
Transformation Techniques and Numerical Solution of Minimax Problems of Optimal Control: Preliminary Results <i>A. Miele and B. P. Mohanty</i>	693

Bifurcation of Closed Paths from a Closed Path in $R^2$ <i>Vinicio Moauro</i>	703
Local Estimates and the Existence of Multiple Solutions to Nonlinear Elliptic Problems <i>R. Kent Nagle</i>	713
Sequence of Iterates in Locally Convex Spaces <i>S. A. Naimpally and K. L. Singh</i>	725
On Well-Posed and Ill-Posed Extremal Problems <i>M. Z. Nashed</i>	737
A Nonlinear Volterra Equation in Viscoelasticity <i>John A. Nohel</i>	747
A Model of Whole Muscles Incorporating Functionally Important Nonlinearities <i>M. N. Oğuztöreli and R. B. Stein</i>	749
Asymptotic Limit and Blowing-Up Behavior of Solutions for a Reaction-Diffusion System <i>C. V. Pao</i>	767
Large-Scale Eigenmodes of a Turbulent Flat-Plate Boundary Layer <i>Fred R. Payne</i>	781
Nonlinear Oscillations in Triggered Systems <i>V. M. Popov</i>	793
Behavior of Solutions of Some Spatially Dependent Integrodifferential Equations <i>M. Assunta Pozio</i>	809
Nonlinear Equations and Passive Networks <i>A. G. Ramm</i>	819
A Briot-Bouquet Equation and Subordination <i>Maxwell O. Read</i>	821
Global Stability of Balanced Predator-Prey Systems <i>Ray Redheffer and Zhou Zhiming</i>	825
Nonlinear Semigroups, Accretive Operators, and Applications <i>Simeon Reich</i>	831
Activation-Inhibition Patterns <i>Robert Rosen</i>	839
On the Development of an Intrinsic Definition of the Leray-Schauder Degree <i>Erich H. Rothe</i>	847
Some Recent Developments in the Infinite Time Optimal Control Problem <i>Emilio O. Roxin and Lynnell E. Stern</i>	859
On Some Nonlinear Problems of Analytical Mechanics and Theory of Stability <i>V. V. Rumjantsev</i>	869

Periodic Environments, Harvesting, and a Riccati Equation <i>David A. Sánchez</i>	883
A Heuristic Way of Finding Linear Problems from Soliton Solutions of Nonlinear Wave Equations <i>Junkichi Satsuma</i>	887
Existence of Carathéodory–Martin Evolutions <i>Eric Schechter</i>	895
Estimates for Vector-Valued Elliptic–Parabolic Problems of the Second Order <i>Johann Schröder</i>	901
Qualitative Behavior of Ordinary Differential Equations of the Quasilinear and Related Types <i>Jerry D. Schuur</i>	911
On the Existence of Lyapunov Functions in General Systems <i>Peter Seibert</i>	917
Differential Modules and Theorem of Hukuhara–Turrittin <i>Yasutaka Sibuya</i>	927
Time-Dependent Integrodifferential Equations in Banach Spaces <i>Eugenio Sinestrari</i>	939
Solvability of Nonlinear Odd-Ordered Differential Equations Using $K$ -Monotonicity <i>Karen Singkofer</i>	947
Monotonicity and Upper Semicontinuity of Multifunctions <i>M. B. Suryanarayana</i>	957
Classification of Certain Continuous Flows <i>Ennodio Torres</i>	965
Pharmacokinetic Systems Analysis: Some New Formulations <i>Chris P. Tsokos</i>	971
Functional Difference Equations and an Epidemic Model <i>Lawrence Turyn</i>	979
Necessary and Sufficient Conditions for Continuous Dependence of Fixed Points of $\alpha$ -Condensing Maps <i>Zdenek Vorel</i>	987
Differential Inequalities—In Memoriam of Jacek Szarski (1921–1980) <i>Wolfgang Walter</i>	991
Asymptotic Conditions for Forced Nonlinear Oscillations <i>James R. Ward, Jr.</i>	993
Lyapunov Functions for Evolution Equations in Hilbert Spaces via the Operational Riccati Equation <i>D. Wexler</i>	997
Models of Cell Kinetics and the Estimation of Macromolecular Synthesis Rates <i>R. Allen White and Stuart O. Zimmerman</i>	1003

<b>Distributional and Analytic Solutions of Functional Differential Equations</b>	<b>1017</b>
<i>Joseph Wiener</i>	
<b>Modeling Cellular Systems and Aging Processes: II. Some Thoughts on Describing an Asynchronously Dividing Cellular System</b>	<b>1023</b>
<i>Matthew Witten</i>	