



Elliptic Boundary Value Problems

AMS TRANSLATIONS, SERIES 2

This volume contains seven papers translated from the Russian on the topic of elliptic boundary value problems.

Contents

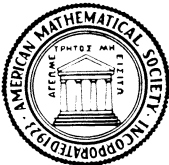
- V. G. Maz'ya and B. A. Plamenevskii, *Estimates in L_p and in Hölder classes and the Miranda-Agmon maximum principle for solutions of elliptic boundary value problems in domains with singular points on the boundary*
- . *On the coefficients in the asymptotics of solutions of elliptic boundary value problems in domains with conical points*
- . *Weight spaces with inhomogeneous norms and boundary value problems in domains with conical points*
- . *On properties of solutions of three-dimensional problems of elasticity theory and hydrodynamics in domains with isolated singular points*

- V. G. Maz'ya, B. A. Plamenevskii and N. F. Morozov, *On nonlinear bending of a plate with a crack*
- V. G. Maz'ya and B. A. Plamenevskii, *Schauder estimates of solutions of elliptic boundary value problems in domains with edges on the boundary*
- V. G. Maz'ya, B. A. Plamenevskii and L. Stupyaus [Stupeus], *The three-dimensional problem of steady-state motion of a fluid with a free boundary*

AMS Translations, Series 2

Volume 123, approx. 270 pages (hardcover)
1980 *Mathematics Subject Classifications*:
35B40, 35B45, 46E35, 73C10, 76D05 and others
ISBN 0-8218-3082-1; LC 84-15750
Publication date: December 1984
List price \$75, institutional member \$60,
individual member \$45
To order, please specify TRANS2/123MC

Shipping/Handling: 1st book \$2, each add'l \$1, max. \$25; by air, 1st book \$5, each add'l \$3, max. \$100
Prepayment is required. Order from American Mathematical Society, P.O. Box 1571, Annex Station, Providence, RI 02901-1571, or call toll free 800-556-7774 to charge with Visa or MasterCard.



Fluid Dynamics in Astrophysics and Geophysics

Norman R. Lebovitz, Editor

LECTURES IN APPLIED MATHEMATICS, VOLUME 20

This book features two main articles on geophysical fluid dynamics and on astrophysical fluid dynamics (by Rhines and Schutz, respectively), some timely articles on currently interesting topics in these areas, and a couple of articles on mathematical methods which are finding applications in these two areas of science.

The hope is that the juxtaposition of these two fields of application of fluid dynamics will help to expose their common foundations and methods, and open up their problem areas to a wider scientific community.

Applied mathematicians interested in acquiring a background in astro- or geophysics, and who want to understand the areas common to these two disciplines, will find these papers illuminating.

Contents

I. Geophysical fluid dynamics

Peter B. Rhines, *Lectures on geophysical fluid dynamics*

Larry G. Redekopp, *Nonlinear waves in geophysics: long internal waves*

P. Huerre and L. G. Redekopp, *Nonlinear evolution equations and critical layers*

II. Astrophysical fluid dynamics

B. F. Schutz, *Problems in astrophysical fluid dynamics*

Peter Bodenheimer, *Protostar collapse*

C. Hunter, *Galactic dynamics*

III. Mathematical technique

D. H. Sattinger, *Bifurcation from spherical symmetry*

John Guckenheimer, *An introduction to chaotic motion and strange attractors*

J. L. Bona, W. G. Pritchard and L. R. Scott, *A comparison of solutions of two model equations for long waves*

1980 *Mathematics Subject Classifications*: 76, 85, 86
Lectures in Applied Mathematics
Volume 20, x + 270 pages (hard cover)
List price \$50, institutional member \$40,
individual member \$30
ISBN 0-8218-1120-7; LC 83-2705
Publication date: June 1983
To order, please specify LAM/20MC

Shipping/Handling: 1st book \$2, each add'l \$1, max. \$25; by air, 1st book \$5, each add'l \$3, max. \$100
Prepayment is required. Order from American Mathematical Society, P.O. Box 1571, Annex Station, Providence, RI 02901-1571, or call toll free 800-556-7774 to charge with Visa or MasterCard.

The T_EXbook

Donald E. Knuth

This is a guide to computer typesetting using T_EX written by the system's creator. T_EX represents the state-of-the-art in computer typesetting. It is particularly valuable where the article, document, or book to be produced contains a lot of mathematical notation where the user is concerned with the quality of the mathematical displays. T_EX software offers both writers and publishers the opportunity to produce technical text with the speed and efficiency of a computer system. Novice and expert alike will gain from The T_EXbook the level of information they seek. T_EX contains the detail required for pre-

paring complex mathematics once a user has become experienced.

1980 *Mathematics Subject Classifications*: 00A69, 00A20, 68B99, 68K05

The T_EXbook
438 pages (soft cover spiral bound)
List price \$15
ISBN 0-201-13448-9; LC 83-830
Publication date: January 1984
To order, please specify TEXBK/MC

*Published jointly by the AMS and Addison-Wesley Publishing Company.

Shipping/Handling: 1st book \$2, each add'l \$1, max. \$25; by air, 1st book \$5, each add'l \$3, max. \$100
Prepayment is required. Order from American Mathematical Society, P.O. Box 1571, Annex Station, Providence, RI 02901-1571, or call toll free 800-556-7774 to charge with Visa or MasterCard.

Special and Spurious Solutions of

$$\dot{x}(t) = -\alpha f(x(t-1))$$

Roger D. Nussbaum and Heinz-Otto Peitgen

Differential delay equations of the type $\dot{x}(t) = -\alpha f(x(t-1))$ have become an important tool in modelling various kinds of problems in biology, chemistry and physics. Particular interest is in the existence and nature of periodic solutions. This memoir investigates a special class of such periodic solutions which exhibit certain symmetries by means of topological perturbation techniques. Moreover it is devoted to the existence and explanation of 'spurious solutions'. These are

numerical solutions which are perfect solutions of the chosen numerical scheme but which are by no means approximative solutions. This phenomenon is visualized by the aid of computer graphical experiments and explained by the underlying homoclinic structure.

Memoirs of the AMS

Number 310, pages (softcover)
1980 *Mathematics Subject Classifications*:
34K15, 58F15, 47H10, 47H15, 39A12, 58F22
ISBN 0-8218-2311-6; LC 84-14568
Publication date: September 1984
List price \$13, institutional member \$10,
individual member \$8
To order, please specify MEMO/310 MC

Shipping/Handling: 1st book \$2, each additional \$1, maximum \$25; by air, 1st book \$5, each additional \$3, maximum \$100
Prepayment required. Order from American Mathematical Society, P.O. Box 1571, Annex Station Providence, RI 02901-1571, or call toll free 800-556-7774 to charge with Visa or MasterCard

Seven Papers in Applied Mathematics*

(American Mathematical Society Translations, Series 2, Volume 125)

The papers in this book are translated from the Russian.

Contents

- D. V. Anosov.** *Smooth dynamical systems*
V. S. Bondarchuk. *A periodic problem in the calculus of variations and deformations of Hamiltonian systems*
V. G. Babitskiĭ and A. D. Myshkis. *The monotonicity of the change in the first eigenvalue for a class of nonselfadjoint boundary value problems in the theory of hydrodynamical stability*

A. V. Kazhikhov and V. B. Nikolaev. *On the correctness of boundary value problems for the equations of a viscous gas with nonmonotone state function*

Yu. A. Eremin, E. V. Zakharov and N. I. Nesmeyanova. *The method of fundamental solutions in problems of diffraction of electromagnetic waves by bodies of revolution*

N. N. Bogolyubov. *Kinetic equations and Green's functions in statistical mechanics*

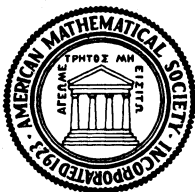
O. I. Bogoyavlenskii. *Qualitative theory of homogeneous cosmological models. II*

1980 *Mathematics Subject Classifications*:
58, 35, 34, 76, 78, 70, 82, 83, 49, 85
ISBN 0-8218-3087-2, LC 84-21681
ISSN 0065-9290
vi + 130 pages (hardcover), April 1985
List price \$45, Institutional member \$36,
Individual member \$27

Shipping and handling charges must be added
To order, please specify TRANS2/125MC



Shipping/Handling: 1st book \$2, each additional \$1, maximum \$25; by air, 1st book \$5, each additional \$3, maximum \$100
Prepayment required. Order from American Mathematical Society, P.O. Box 1571, Annex Station Providence, RI 02901-1571, or call toll free 800-556-7774 to charge with Visa or MasterCard



Large-Scale Computations in Fluid Mechanics

Bjorn E. Engquist, Stanley Osher and Richard C. J. Somerville, Editors

This is the proceedings of an AMS-SIAM Summer Seminar on Applied Mathematics held at Scripps Institution of Oceanography in 1983, whose purpose was to bring scientists interested in computational fluid mechanics together with numerical analysts and mathematicians working in large-scale computations. The complexity of many contemporary problems of fluid mechanics is so great as to tax the capabilities of present-day computers. There is a real need and opportunity for numerical analysis to aid research on the physical problems of achieving optimal utilization of current computers.

Fifty lectures were given on subjects equally divided between mathematics and applications. The numerical modeling included geophysical problems of the atmosphere, ocean, and interior of the earth, and planetary, solar, and stellar atmospheres. Applications ranged from idealized turbulence in laboratory convection models to operational weather prediction. Engineering applications included aerodynamics, combustion, and flow in porous media. Recent advances in numerical analysis which have applications to these problems were stressed. These include shock capturing algorithms, spectral methods, boundary treatments, vortex methods, and parallel computing.

In addition to specialized research lectures, several speakers gave talks surveying important areas of numerical analysis and computational fluid dynamics.

Contributors

A. P. M. Baede	Randall J. LeVeque
J. R. Bates	Mitchell Luskin
Marsha J. Berger	Oliver A. McBryan
Yann Brenier	Fedor Mesinger
Sukumar R. Chakravarthy	Daniel Michelson
Carlos Conca	Michael J. Naughton
M. J. P. Cullen	J. C. Nedelec
S. K. Dey	Stanley Osher
Aaron L. Fogelson	V. A. Patel
Tsvi Gal-Chen	R. J. Purser
Ahmed F. Ghoniem	P. Roe
Moshe Goldberg	Robert Sadourny
Jonathan B. Goodman	Richard Sanders
Philip M. Gresho	L. R. Scott
R. C. Grimm	James A. Sethian
Richard Grotjahn	R. C. J. Somerville
Bertil Gustafsson	Charles G. Speziale
Aml Harten	Peter K. Sweby
David H. Hathaway	Eitan Tadmor
M. Yousuff Hussaini	Lloyd N. Trefethen
James M. Hyman	M. Vogelius
Antony Jameson	R. F. Warming
Zavisa I. Janjic	C. C. Wu
M. Jarraud	H. C. Yee
Haroon Khesghi	Thomas A. Zang
Bram van Leer	

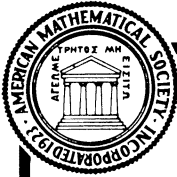
Lectures in Applied Mathematics, Volume 22, July 1985, 387 pages (hardcover) (part 1), 422 pages (hardcover) (part 2)

Set: List price \$110, Institutional member \$88, Individual member \$66

Part 1: List price \$66, Institutional member \$53, Individual member \$40

Part 2: List price \$66, Institutional member \$53, Individual member \$40. To order, please specify LAM/22MC (set), LAM/22.1MC (part 1), LAM/22.2MC (part 2)

Shipping/Handling: 1st book \$2, each add'l \$1, max. \$25; by air, 1st book \$5, each add'l \$3, max. \$100
Prepayment required. Order from American Mathematical Society, P.O. Box 1571, Annex Station
Providence, RI 02901-1571, or call toll free 800-556-7774 to charge with VISA or MasterCard



New Publications in the Proceedings of Symposia in Applied Mathematics Series

Applied Cryptology, Cryptographic Protocols, and Computer Security Models

**Richard A. DeMillo, George I. Davida,
David P. Dobkin, Michael A. Harrison,
and Richard J. Lipton, Editors**

(Proceedings of Symposia in Applied
Mathematics. AMS Short Course Lecture
Notes. Volume 29)

1980 *Mathematics Subject Classifications*:
68-02, 68B99, 68C99
ISBN 0-8218-0041-8, LC 83-15548
xii + 204 pages (softcover), November 1983,
reprinted 1984
List price \$24, Institutional member \$19,
Individual member \$14
To order, please specify PSAPM/29

Population Biology

Simon A. Levin, Editor

(Proceedings of Symposia in Applied
Mathematics. AMS Short Course Lecture
Notes. Volume 30)

1980 *Mathematics Subject Classifications*:
92A15, 92A10, 92A17
ISBN 0-8218-0083-3, LC 83-21389
ISSN 0160-7634
x + 102 pages pages, March 1984
Hardcover: List price \$21, Institutional member
\$17, Individual member \$13
Softcover: List price \$27, Institutional member
\$22, Individual member \$16
To order, please specify PSAPMS/30
(hardcover), PSAPM/30 (softcover)

Computer Communications

B. Gopinath, Editor

(Proceedings of Symposia in Applied
Mathematics. AMS Short Course Lecture
Notes. Volume 31)

1980 *Mathematics Subject Classifications*:
60Fxx, 60Gxx, 60Jxx, 68Exx, 90Bxx, 94Axx
ISBN 0-8218-0082-5, LC 84-24556
ISSN 0160-7634
x + 124 pages, June 1985
Hardcover: List price \$27, Institutional member
\$22, Individual member \$16
Softcover: List price \$21, Institutional member
\$17, Individual member \$13
To order, please specify PSAPM/31 (hardcover),
PSAPMS/31 (softcover)

Shipping/Handling: 1st book \$2, each add'l \$1, \$25 max. By air, 1st book \$5, each add'l \$3, \$100 max.
Prepayment required. Order from AMS, P.O. Box 1571, Annex Station
Providence, RI 02901-1571, or call 800-556-7774 to use VISA or MasterCard.

Environmental and Natural Resources Mathematics

Robert McKelvey, Editor

(Proceedings of Symposia in Applied
Mathematics. AMS Short Course Lecture
Notes. Volume 32)

The lectures and the panel discussion held at
this 1984 AMS short course explored the role
mathematicians and mathematically trained
scientists have played in the development of
natural resource modelling. The techniques
of mathematical modelling have contributed
to the establishment of a coherent theory
of efficient and conservative management of
geologic, atmospheric and biologic resources.
The discussion also considered how these
techniques might be incorporated into graduate
and undergraduate mathematics education.

Contents

Richard E. Plant, *Applications of mathematics in
insect pest management*; **Maureen L. Cropper**,
Economic incentives for pollution control;
Geoffrey Heal, *Depletion and discounting: a
classical issue in the economics of exhaustible
resources*; **Colln W. Clark**, *Capital theoretic
aspects of renewable resource management*;
Frank H. Clarke, *Applying abstract control theory
to concrete models*; **Graciela Chichilnisky**,
*International trade in resources: a general
equilibrium analysis*; **Panel Discussion**, *The role
of mathematicians in natural resource modeling*

1980 *Mathematics Subject Classifications*:
49-06, 90-06, 92-06
ISBN 0-8218-0087-6, LC 85-3917
ISSN 0075-8485

xii + 143 pages, July 1985
Hardcover: List price \$34, Institutional member
\$27, Individual member \$20
Softcover: List price \$28, Institutional member
\$22, Individual member \$17
To order, please specify PSAPM/32 (hardcover),
PSAPMS/32 (softcover)

Fair Allocation

H. Peyton Young, Editor

(Proceedings of Symposia in Applied
Mathematics. AMS Short Course Lecture
Notes. Volume 33)

Soon to
Appear

(Continued from back cover)

Veikko Ennola and Reino Turunen , On Cyclic Cubic Fields	585
V. Ennola, S. Mäki and R. Turunen , On Real Cyclic Sextic Fields.....	591
Ezra Brown , Sets in Which $xy + k$ is Always a Square	613
Alice A. Deanin , A Counterexample to a Conjecture of Mahler on Best P -Adic Diophantine Approximation Constants	621
Reviews and Descriptions of Tables and Books	633
Ferziger 11, Carey and Oden 12, Thomée 13, Ratschek and Rokne 14, Pulleyblank 15	
Corrigendum	637
Jaeschke	
Indices to Volumes XLIV and XLV	639
Supplement to "Linear Multistep Methods for Volterra Integral and Integro- Differential Equations" by P. J. van der Houwen and H. J. J. te Riele ..	S21

No microfiche supplement in this issue

MATHEMATICS OF COMPUTATION

TABLE OF CONTENTS

October 1985

Lloyd N. Trefethen , Stability of Finite-Difference Models Containing Two Boundaries or Interfaces.....	279
Marsha J. Berger , Stability of Interfaces with Mesh Refinement.....	301
Endre Süli, Boško Jovanović and Lav Ivanović , Finite Difference Approximations of Generalized Solutions.....	319
Vassilios A. Dougalis and Ohannes A. Karakashian , On Some High-Order Accurate Fully Discrete Galerkin Methods for the Korteweg-de Vries Equation.....	329
Haroon Khesghi and Mitchell Luskin , Analysis of the Finite Element Variable Penalty Method for Stokes Equations.....	347
Rolf Jeltsch and Klaus-Günther Strack , Accuracy Bounds for Semidiscretizations of Hyperbolic Problems.....	365
M. N. Spijker , Stepsize Restrictions for Stability of One-Step Methods in the Numerical Solution of Initial Value Problems.....	377
J. Bigge and E. Bohl , Deformations of the Bifurcation Diagram Due to Discretization.....	393
Heinz W. Engl and Andreas Neubauer , An Improved Version of Marti's Method for Solving Ill-Posed Linear Integral Equations.....	405
Hermann Brunner , The Numerical Solution of Weakly Singular Volterra Integral Equations By Collocation on Graded Meshes.....	417
P. J. van der Houwen and H. J. J. te Riele , Linear Multistep Methods for Volterra Integral and Integro-Differential Equations.....	439
Ch. Lubich , Fractional Linear Multistep Methods for Abel-Volterra Integral Equations of the Second Kind.....	463
R. Fletcher and S. P. J. Matthews , A Stable Algorithm for Updating Triangular Factors Under a Rank One Change.....	471
T. A. Porsching , Estimation of the Error in the Reduced Basis Method Solution of Nonlinear Equations.....	487
C. de Boor and R. DeVore , A Geometric Proof of Total Positivity for Spline Interpolation.....	497
J. F. Traub and D. Lee , Optimal Integration for Functions of Bounded Variation.....	505
G. Akrivis , The Error Norm of Certain Gaussian Quadrature Formulae.....	513
Stanisław Lewanowicz , Recurrence Relations for Hypergeometric Functions of Unit Argument.....	521
C. L. Frenzen and R. Wong , A Note on Asymptotic Evaluation of Some Hankel Transforms.....	537
Henry E. Fettis , Further Extensions of a Legendre Function Integral.....	549
J. H. McCabe and G. M. Phillips , Aitken Sequences and Generalized Fibonacci Numbers.....	553
John F. Monahan , Accuracy in Random Number Generation.....	559
Theresa P. Vaughan , On Computing the Discriminant of an Algebraic Number Field.....	569

(Continued on inside back cover)