

IMA SUMMER PROGRAMS

- 1987 Robotics
- 1988 Signal Processing
- 1989 Robust Statistics and Diagnostics
- 1990 Radar and Sonar (June 18 - June 29)
New Directions in Time Series Analysis (July 2 - July 27)
- 1991 Semiconductors
- 1992 Environmental Studies: Mathematical, Computational, and
Statistical Analysis
- 1993 Modeling, Mesh Generation, and Adaptive Numerical Methods
for Partial Differential Equations
- 1994 Molecular Biology
- 1995 Large Scale Optimizations with Applications to Inverse Problems,
Optimal Control and Design, and Molecular and Structural
Optimization
- 1996 Emerging Applications of Number Theory (July 15 – July 26)
Theory of Random Sets (August 22 – August 24)
- 1997 Statistics in the Health Sciences
- 1998 Coding and Cryptography (July 6 – July 18)
Mathematical Modeling in Industry (July 22 – July 31)
- 1999 Codes, Systems and Graphical Models

SPRINGER LECTURE NOTES FROM THE IMA:

The Mathematics and Physics of Disordered Media

Editors: Barry Hughes and Barry Ninham
(Lecture Notes in Math., Volume 1035, 1983)

Orienting Polymers

Editor: J.L. Ericksen
(Lecture Notes in Math., Volume 1063, 1984)

New Perspectives in Thermodynamics

Editor: James Serrin
(Springer-Verlag, 1986)

Models of Economic Dynamics

Editor: Hugo Sonnenschein
(Lecture Notes in Econ., Volume 264, 1986)

The IMA Volumes in Mathematics and its Applications

Current Volumes:

- 1 **Homogenization and Effective Moduli of Materials and Media**
J. Ericksen, D. Kinderlehrer, R. Kohn, and J.-L. Lions (eds.)
- 2 **Oscillation Theory, Computation, and Methods of Compensated Compactness** C. Dafermos, J. Ericksen, D. Kinderlehrer, and M. Slemrod (eds.)
- 3 **Metastability and Incompletely Posed Problems**
S. Antman, J. Ericksen, D. Kinderlehrer, and I. Muller (eds.)
- 4 **Dynamical Problems in Continuum Physics**
J. Bona, C. Dafermos, J. Ericksen, and D. Kinderlehrer (eds.)
- 5 **Theory and Applications of Liquid Crystals**
J. Ericksen and D. Kinderlehrer (eds.)
- 6 **Amorphous Polymers and Non-Newtonian Fluids**
C. Dafermos, J. Ericksen, and D. Kinderlehrer (eds.)
- 7 **Random Media** G. Papanicolaou (ed.)
- 8 **Percolation Theory and Ergodic Theory of Infinite Particle Systems** H. Kesten (ed.)
- 9 **Hydrodynamic Behavior and Interacting Particle Systems**
G. Papanicolaou (ed.)
- 10 **Stochastic Differential Systems, Stochastic Control Theory, and Applications** W. Fleming and P.-L. Lions (eds.)
- 11 **Numerical Simulation in Oil Recovery** M.F. Wheeler (ed.)
- 12 **Computational Fluid Dynamics and Reacting Gas Flows**
B. Engquist, M. Luskin, and A. Majda (eds.)
- 13 **Numerical Algorithms for Parallel Computer Architectures**
M.H. Schultz (ed.)
- 14 **Mathematical Aspects of Scientific Software** J.R. Rice (ed.)
- 15 **Mathematical Frontiers in Computational Chemical Physics**
D. Truhlar (ed.)
- 16 **Mathematics in Industrial Problems** A. Friedman
- 17 **Applications of Combinatorics and Graph Theory to the Biological and Social Sciences** F. Roberts (ed.)
- 18 **q -Series and Partitions** D. Stanton (ed.)
- 19 **Invariant Theory and Tableaux** D. Stanton (ed.)
- 20 **Coding Theory and Design Theory Part I: Coding Theory**
D. Ray-Chaudhuri (ed.)
- 21 **Coding Theory and Design Theory Part II: Design Theory**
D. Ray-Chaudhuri (ed.)
- 22 **Signal Processing Part I: Signal Processing Theory**
L. Auslander, F.A. Grünbaum, J.W. Helton, T. Kailath, P. Khargonekar, and S. Mitter (eds.)

- 23 **Signal Processing Part II: Control Theory and Applications of Signal Processing** L. Auslander, F.A. Grünbaum, J.W. Helton, T. Kailath, P. Khargonekar, and S. Mitter (eds.)
- 24 **Mathematics in Industrial Problems, Part 2** A. Friedman
- 25 **Solitons in Physics, Mathematics, and Nonlinear Optics** P.J. Olver and D.H. Sattinger (eds.)
- 26 **Two Phase Flows and Waves** D.D. Joseph and D.G. Schaeffer (eds.)
- 27 **Nonlinear Evolution Equations that Change Type** B.L. Keyfitz and M. Shearer (eds.)
- 28 **Computer Aided Proofs in Analysis** K. Meyer and D. Schmidt (eds.)
- 29 **Multidimensional Hyperbolic Problems and Computations** A. Majda and J. Glimm (eds.)
- 30 **Microlocal Analysis and Nonlinear Waves** M. Beals, R. Melrose, and J. Rauch (eds.)
- 31 **Mathematics in Industrial Problems, Part 3** A. Friedman
- 32 **Radar and Sonar, Part I** R. Blahut, W. Miller, Jr., and C. Wilcox
- 33 **Directions in Robust Statistics and Diagnostics: Part I** W.A. Stahel and S. Weisberg (eds.)
- 34 **Directions in Robust Statistics and Diagnostics: Part II** W.A. Stahel and S. Weisberg (eds.)
- 35 **Dynamical Issues in Combustion Theory** P. Fife, A. Liñán, and F.A. Williams (eds.)
- 36 **Computing and Graphics in Statistics** A. Buja and P. Tukey (eds.)
- 37 **Patterns and Dynamics in Reactive Media** H. Swinney, G. Aris, and D. Aronson (eds.)
- 38 **Mathematics in Industrial Problems, Part 4** A. Friedman
- 39 **Radar and Sonar, Part II** F.A. Grünbaum, M. Bernfeld, and R.E. Blahut (eds.)
- 40 **Nonlinear Phenomena in Atmospheric and Oceanic Sciences** G.F. Carnevale and R.T. Pierrehumbert (eds.)
- 41 **Chaotic Processes in the Geological Sciences** D.A. Yuen (ed.)
- 42 **Partial Differential Equations with Minimal Smoothness and Applications** B. Dahlberg, E. Fabes, R. Fefferman, D. Jerison, C. Kenig, and J. Pipher (eds.)
- 43 **On the Evolution of Phase Boundaries** M.E. Gurtin and G.B. McFadden
- 44 **Twist Mappings and Their Applications** R. McGehee and K.R. Meyer (eds.)
- 45 **New Directions in Time Series Analysis, Part I** D. Brillinger, P. Caines, J. Geweke, E. Parzen, M. Rosenblatt, and M.S. Taqqu (eds.)

- 46 **New Directions in Time Series Analysis, Part II**
D. Brillinger, P. Caines, J. Geweke, E. Parzen, M. Rosenblatt,
and M.S. Taquq (eds.)
- 47 **Degenerate Diffusions**
W.-M. Ni, L.A. Peletier, and J.-L. Vazquez (eds.)
- 48 **Linear Algebra, Markov Chains, and Queuing Models**
C.D. Meyer and R.J. Plemmons (eds.)
- 49 **Mathematics in Industrial Problems, Part 5** A. Friedman
- 50 **Combinatorial and Graph-Theoretic Problems in Linear Algebra**
R.A. Brualdi, S. Friedland, and V. Klee (eds.)
- 51 **Statistical Thermodynamics and Differential Geometry
of Microstructured Materials**
H.T. Davis and J.C.C. Nitsche (eds.)
- 52 **Shock Induced Transitions and Phase Structures in General
Media** J.E. Dunn, R. Fosdick, and M. Slemrod (eds.)
- 53 **Variational and Free Boundary Problems**
A. Friedman and J. Spruck (eds.)
- 54 **Microstructure and Phase Transitions**
D. Kinderlehrer, R. James, M. Luskin, and J.L. Ericksen (eds.)
- 55 **Turbulence in Fluid Flows: A Dynamical Systems Approach**
G.R. Sell, C. Foias, and R. Temam (eds.)
- 56 **Graph Theory and Sparse Matrix Computation**
A. George, J.R. Gilbert, and J.W.H. Liu (eds.)
- 57 **Mathematics in Industrial Problems, Part 6** A. Friedman
- 58 **Semiconductors, Part I**
W.M. Coughran, Jr., J. Cole, P. Lloyd, and J. White (eds.)
- 59 **Semiconductors, Part II**
W.M. Coughran, Jr., J. Cole, P. Lloyd, and J. White (eds.)
- 60 **Recent Advances in Iterative Methods**
G. Golub, A. Greenbaum, and M. Luskin (eds.)
- 61 **Free Boundaries in Viscous Flows**
R.A. Brown and S.H. Davis (eds.)
- 62 **Linear Algebra for Control Theory**
P. Van Dooren and B. Wyman (eds.)
- 63 **Hamiltonian Dynamical Systems: History, Theory,
and Applications**
H.S. Dumas, K.R. Meyer, and D.S. Schmidt (eds.)
- 64 **Systems and Control Theory for Power Systems**
J.H. Chow, P.V. Kokotovic, R.J. Thomas (eds.)
- 65 **Mathematical Finance**
M.H.A. Davis, D. Duffie, W.H. Fleming, and S.E. Shreve (eds.)
- 66 **Robust Control Theory** B.A. Francis and P.P. Khargonekar (eds.)
- 67 **Mathematics in Industrial Problems, Part 7** A. Friedman
- 68 **Flow Control** M.D. Gunzburger (ed.)

- 69 **Linear Algebra for Signal Processing**
A. Bojanczyk and G. Cybenko (eds.)
- 70 **Control and Optimal Design of Distributed Parameter Systems**
J.E. Lagnese, D.L. Russell, and L.W. White (eds.)
- 71 **Stochastic Networks** F.P. Kelly and R.J. Williams (eds.)
- 72 **Discrete Probability and Algorithms**
D. Aldous, P. Diaconis, J. Spencer, and J.M. Steele (eds.)
- 73 **Discrete Event Systems, Manufacturing Systems,
and Communication Networks**
P.R. Kumar and P.P. Varaiya (eds.)
- 74 **Adaptive Control, Filtering, and Signal Processing**
K.J. Aström, G.C. Goodwin, and P.R. Kumar (eds.)
- 75 **Modeling, Mesh Generation, and Adaptive Numerical Methods
for Partial Differential Equations** I. Babuska, J.E. Flaherty,
W.D. Henshaw, J.E. Hopcroft, J.E. Oliger, and T. Tezduyar (eds.)
- 76 **Random Discrete Structures** D. Aldous and R. Pemantle (eds.)
- 77 **Nonlinear Stochastic PDEs: Hydrodynamic Limit and Burgers'
Turbulence** T. Funaki and W.A. Woyczynski (eds.)
- 78 **Nonsmooth Analysis and Geometric Methods in Deterministic
Optimal Control** B.S. Mordukhovich and H.J. Sussmann (eds.)
- 79 **Environmental Studies: Mathematical, Computational,
and Statistical Analysis** M.F. Wheeler (ed.)
- 80 **Image Models (and their Speech Model Cousins)**
S.E. Levinson and L. Shepp (eds.)
- 81 **Genetic Mapping and DNA Sequencing**
T. Speed and M.S. Waterman (eds.)
- 82 **Mathematical Approaches to Biomolecular Structure and Dynamics**
J.P. Mesirov, K. Schulten, and D. Sumners (eds.)
- 83 **Mathematics in Industrial Problems, Part 8** A. Friedman
- 84 **Classical and Modern Branching Processes**
K.B. Athreya and P. Jagers (eds.)
- 85 **Stochastic Models in Geosystems**
S.A. Molchanov and W.A. Woyczynski (eds.)
- 86 **Computational Wave Propagation**
B. Engquist and G.A. Kriegsmann (eds.)
- 87 **Progress in Population Genetics and Human Evolution**
P. Donnelly and S. Tavaré (eds.)
- 88 **Mathematics in Industrial Problems, Part 9** A. Friedman
- 89 **Multiparticle Quantum Scattering With Applications to Nuclear,
Atomic and Molecular Physics** D.G. Truhlar and B. Simon (eds.)
- 90 **Inverse Problems in Wave Propagation** G. Chavent, G. Papanicolau,
P. Sacks, and W.W. Symes (eds.)
- 91 **Singularities and Oscillations** J. Rauch and M. Taylor (eds.)

- 92 **Large-Scale Optimization with Applications, Part I:
Optimization in Inverse Problems and Design**
L.T. Biegler, T.F. Coleman, A.R. Conn, and F. Santosa (eds.)
- 93 **Large-Scale Optimization with Applications, Part II:
Optimal Design and Control**
L.T. Biegler, T.F. Coleman, A.R. Conn, and F. Santosa (eds.)
- 94 **Large-Scale Optimization with Applications, Part III:
Molecular Structure and Optimization**
L.T. Biegler, T.F. Coleman, A.R. Conn, and F. Santosa (eds.)
- 95 **Quasiclassical Methods**
J. Rauch and B. Simon (eds.)
- 96 **Wave Propagation in Complex Media**
G. Papanicolaou (ed.)
- 97 **Random Sets: Theory and Applications**
J. Goutsias, R.P.S. Mahler, and H.T. Nguyen (eds.)
- 98 **Particulate Flows: Processing and Rheology**
D.A. Drew, D.D. Joseph, and S.L. Passman (eds.)
- 99 **Mathematics of Multiscale Materials** K.M. Golden, G.R. Grimmett,
R.D. James, G.W. Milton, and P.N. Sen (eds.)
- 100 **Mathematics in Industrial Problems, Part 10** A. Friedman
- 101 **Nonlinear Optical Materials** J.V. Moloney (ed.)
- 102 **Numerical Methods for Polymeric Systems** S.G. Whittington (ed.)
- 103 **Topology and Geometry in Polymer Science** S.G. Whittington,
D. Sumners, and T. Lodge (eds.)
- 104 **Essays on Mathematical Robotics** J. Baillicul, S.S. Sastry,
and H.J. Sussmann (eds.)
- 105 **Algorithms For Parallel Processing** M.T. Heath, A. Ranade,
and R.S. Schreiber (eds.)
- 106 **Parallel Processing of Discrete Problems** P.M. Pardalos (ed.)
- 107 **The Mathematics of Information Coding, Extraction, and
Distribution** G. Cybenko, D.P. O’Leary, and J. Rissanen (eds.)
- 108 **Rational Drug Design** D.G. Truhlar, W. Howe, A.J. Hopfinger,
J. Blaney, and R.A. Dammkoehler (eds.)
- 109 **Emerging Applications of Number Theory** D.A. Hejhal, J. Friedman,
M.C. Gutzwiller, and A.M. Odlyzko (eds.)
- 110 **Computational Radiology and Imaging: Therapy and Diagnostics** C.
Börgers, F. Natterer (eds.)

FORTHCOMING VOLUMES

1992–1992: *Control Theory*
Robotics

1996 Summer Program: *Emerging Applications of Number Theory*

1996–1997: *Mathematics in High Performance Computing*
Algorithms for Parallel Processing
Evolutionary Algorithms
The Mathematics of Information Coding, Extraction and Distribution
Structured Adaptive Mesh Refinement Grid Methods
Computational Radiology and Imaging: Therapy and Diagnostics
Mathematical and Computational Issues in Drug Design
Rational Drug Design
Grid Generation and Adaptive Algorithms
Parallel Solution of Partial Differential Equations

1997 Summer Program: *Statistics in the Health Sciences*
Week 1: Genetics
Week 2: Imaging
Week 3: Diagnosis and Prediction
Weeks 4 and 5: Design and Analysis of Clinical Trials
Week 6: Statistics and Epidemiology: Environment and Health

1997–1998: *Emerging Applications for Dynamical Systems*
Numerical Methods for Bifurcation Problems
Multiple-time-scale Dynamical Systems
Dynamics of Algorithms