The rubric "domain decomposition" embraces a broad set of research interests, from the theory of partial differential equations to numerical algorithms for their solution. The book includes an excellent historical introduction which first appeared in SIAM News [1] and which describes the subject's origins in the theory of partial differential equations and subsequent development. The introduction [1] also includes some comments on the highlights of the Houston meeting, some of which (unfortunately) are not represented in the published proceedings.

It is noted in the introduction [1] that most commercial codes for solving partial differential equations utilize Gaussian elimination in one form or other. More sophisticated methods as discussed in this book obviously offer some possibility of improved efficiency for solution of the linear equations resulting from discretizing partial differential equations. However, missing from the symposium was a critical evaluation of the relative efficiency of the serious competitors for rapid solution of the linear equations resulting from discretizing partial differential equations. In addition to domain decomposition, one would also want to consider some form of multilevel iterative technique ("multigrid") and efficient node numbering schemes for Gaussian elimination (e.g., minimum degree or nested dissection) as well as possibly others. The question of computational complexity of the competing algorithms becomes even more difficult when parallel computers are to be used, as indicated by Part III of the book.

This book represents the state of the art of domain decomposition methods for partial differential equations as of March, 1989. As such it is clearly a must for anyone working in the field or related ones.

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1. O. Widlund, *Domain decomposition algorithms and the bicentennial of the French Revolution*, SIAM News **22**, July/August, 1989.

34[65–06].—J. C. DÍAZ (Editor), *Mathematics for Large Scale Computing*, Lecture Notes in Pure and Appl. Math., Vol. 120, Dekker, New York and Basel, 1989, xi + 345 pp., 25 cm. Price $85.00.

This book is based on the proceedings of a regional meeting of the American Mathematical Society held in Denton, Texas in 1986. However, it was not published until 1989 due to a lengthy refereeing process. The focus of the book is quite broad, although no more so than the title suggests. It contains both survey articles and original research papers. The principal unifying aspect of the book is the regional location of many of the authors.

The book represents well the breadth of subjects integral to scientific computing. If the individual papers that make up the book had been published in journals, they would have been dispersed among several having distinct objectives. Thus the book can serve as a good indicator of the variety of topics of current research in scientific computing for someone new to the field.

The contents of the book are as follows: On the Gauss-Broyden Method for Nonlinear Least-Squares *by A. Griewank and L. Sheng*; Parallel Adaptive Algorithms for Multiple Integrals *by A. Genz*; A Comparison of Hypercube Implementations of Parallel Shooting *by H. B. Keller and P. Nelson*; An Asymptotic Induced Numerical Method for the Convection-Diffusion-Reaction Equation *by J. S. Scroggs and D. C. Sorensen*; The Rate of Convergence of the Modified Method of Characteristics for Linear Advection Equations in One Dimension *by C. N. Dawson, T. F. Dupont, and M. F. Wheeler*; A Time-Discretization Procedure for a Mixed Finite Element Approximation of Contamination by Incompressible Nuclear Waste in Porous Media by *R. E. Ewing, Y. Yuan, and G. Li*; Implementation of Finite Element Alternating-Direction Methods for Vector Computers *by S. V. Krishnamachari and L. J. Hayes*; Performance of Advanced Scientific Computers for the Efficient Solution of an Elastic Wave Code for Seismic Modeling *by K. E. Jordan*; Generalized Gray Codes and Their Properties *by L. S. Barasch, S. Lakshmivarahan, and S. K. Dhall*; Nested Block Factorization Preconditioners for Convective-Diffusion Problems in Three Dimensions *by G. K. Leaf, M. Minkoff, and J. C. Díaz*; Performance of the Chebyshev Iterative Method, GMRES and ORTHOMIN on a Set of Oil-Reservoir Simulation Problems *by S. Gómes and J. L. Morales*; A Survey of Spline Collocation Methods for the Numerical Solution of Differential Equations *by G. Fairweather and D. Meade.*

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35[93–06, 93B40, 65–06].—K. BOWERS & J. LUND (Editors), *Computation and Control*, Progress in Systems and Control Theory, Vol. 1, Birkhäuser, Boston, 1989, xi + 410 pp., 23 $\frac{1}{2}$ cm. Price $49.00.

The proceedings of the 1988 Bozeman, Montana conference organized by Bowers and Lund reveal the symbiotic relationship of approximation and computation theory with control theory. These thirty published papers cover a broad spectrum of pure and applied mathematics. An indication of the contents is given by listing the titles of the works presented by the organizers and their four plenary speakers C. I. Byrnes, W. Gautschi, C. F. Martin, and F. Stenger:

"Efficient Numerical Solution of Fourth-Order Problems in the Modeling of Flexible Structures" by R. C. Smith, Bowers, and Lund;

"Accuracy and Conditioning in the Inversion of the Heat Equation" by Lund;

"Feedback Design from the Zero Dynamics Point of View" by Byrnes and A. Isidori.

"Orthogonality—Conventional and Unconventional—in Numerical Analysis" by Gautschi;

"Observability, Interpolation and Related Topics" by Martin.

"Explicit Approximate Methods for Computational Control Theory" by Stenger.