The book is printed directly from manuscripts presented in camera-ready form and is remarkably easy to read. It should be a valuable reference work and it augurs well for the success of the series.

E. I.

36[68–02, 65–02, 70–04, 68Q40, 65C99].—ROBERT GROSSMAN (Editor), *Symbolic Computation: Applications to Scientific Computing*, Frontiers in Applied Mathematics, Vol. 5, SIAM, Philadelphia, PA, 1989, x + 185 pp., 23 cm. Price $24.50 paperback.

These collected papers provide a timely summary of the state of symbolic/numerical algorithms and software for dynamical systems, Lie brackets and vector fields, finite difference operators and domains, and perturbation theory. Their particular interest lies in the diversity of approaches represented. The paper "Dynamicist's Workbench" by Abelson and Sussman describes an "automatic programming" technique that symbolically generates a "complete set" of numerical simulation programs to enumerate all "qualitatively different" behaviors of a physical system. At a different point on the spectrum, the papers "Multibody Simulation" by Sreenath and Krishnaprasad and "Symbolic Computations in Differential Geometry" by Akhrif and Blankenship present high-level user interfaces for the instantiation simulation, and visualization of physical systems under human control. The paper "FIDIL: A Language for Scientific Programming" by Hilfinger and Colella presents a *C*-like programming language that supports manipulation of domains and maps for finite difference schemes as first-class objects. The paper "Perturbation Methods and Computer Algebra" by Rand describes the use of computer algebra to automate the solution of nonlinear differential equations by perturbation methods. In the paper "Vector Fields and Nilpotent Lie Algebras" by Grayson and Grossman, the efficient symbolic computation of flows of ordinary differential equations is described. An introductory chapter by Fateman and Grossman sets the stage with a discussion of algebraic manipulation for operator algebras and operator actions.

The material in this volume offers the reader a broad yet detailed view of current progress towards a compelling goal: the combination of symbolic, numerical, and graphical computation for "user-friendly" modeling, visualization and analysis of physical systems. It is warmly recommended to all who share an interest in this goal.

DENNIS ARNON

Electronic Documents Laboratory
Xerox Corporation
Palo Alto Research Center
3333 Coyote Hill Road
Palo Alto, California 94304