(3) Electron beam lithography (computer chips).
{Integral transforms, heat equation, scattering, Fourier series.}
(4) Color film negative development.
{Diffusion, maximum principles.}
(5) Automobile catalytic converter.
{Optimal control, calculus of variations.}
(6) Photocopy machine (electric image).
{Poisson equation, finite differences, direct and iterative methods for solution.}
(7) Photocopy machine (visible image).
{Free boundary problems.}

This wide range of topics is succinctly and carefully presented. Hence the volume is a valuable teaching resource for a variety of upper level undergraduate and beginning graduate courses. Each chapter begins with a description of the physical phenomena, followed by a mathematical formulation of a model and simplification(s) thereof. The simplest models permit complete mathematical analysis and numerical solution. All of the models have been thoroughly studied in the previously published six volumes by the first author and in other, also given, references. Each chapter concludes with a summary of the topics that were covered. Problems are presented within each chapter. These exercises are generally nontrivial. The authors suggest that some of the computing projects may serve as final examinations, that could well take considerable time and effort to complete!

Here is a challenging noncomputational problem that is given in Chapter 5. The classical brachistochrone problem is stated and provides the motivation for a discussion of simple variational problems. The derivation of the Euler-Lagrange equation is then produced. This Euler equation is a necessary condition that is satisfied by the solution of any simple variational problem. The exercise presented at this point states: "Use the Euler equation to find the solution of the brachistochrone problem."

The authors have performed a valuable service by choosing interesting examples of real-world problems and formulating them as mathematical problems. They achieve their aim to show that Calculus and computers serve as ubiquitous tools for today and tomorrow. The material was used by the second author and a colleague in a one-year upper-level course during 1992–3. The students came "from mathematics, physics, computer science, and various engineering departments." The authors recommend, "One attitude to encourage is that the class is one research organization attacking some problems. Thus, it makes sense to divide the problems among various students or groups of students."

E. I.

16[65-06, 65Y05]—*Environments and tools for parallel scientific computing*, Jack J. Dongarra and Bernard Tourancheau (Editors), SIAM Proceedings Series, SIAM, Philadelphia, PA, 1994, xii+292 pp., $25\frac{1}{2}$ cm, softcover, \$38.50

This book is based on the proceedings of *The Second Workshop on Environments and Tools for Parallel Scientific Computing* which took place at Townsend, Tennessee, on May 25–27, 1994. The book is organized in four parts. The first part addresses issues related to data mapping in HPF, run-time support libraries, and editors to support programming in FORTRAN D and HPF. The second part deals with libraries and languages to support various existing parallel programming models and some activities in parallel numerical software. It includes papers on message passing interface (MPI), varied communication models, migratable, exportable and multi-threaded versions of PVM for homogeneous and heterogeneous network-based computing, the C^{++} version of HPF pC^{++}, and a new C^{++} based language that allows parallel programming models to be implemented as libraries. The third and fourth parts of the book present environments that attempt to support various parallel programming paradigms and integrate compiling, debugging and tracing, performance evaluation, and visualization tools at various levels. It includes papers on various parallel environments such as CODE 2.0 (task/dependence), LHPC (distributed shared memory), τ (TAU:pC^{++}), PPPE (MPI and HPF), PARADYN (PVM), ParaGraph and CAPSE (message passing), EPPP (HPC), TOPSYS (Munich multitasking kernel), and IMPOV. The book will be useful to students and researchers working in the field of high performance computing.

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17[68-01, 65-01]—*Solving Problems in Scientific Computing Using MAPLE and MATLAB*, by Walter Gander and Jiří Hřebíček, Springer, Berlin, 1993, xiv+268 pp., $23\frac{1}{2}$ cm, softcover, \$39.00

This text presents the solution to several interesting scientific computation problems via the use of either one of the computer languages of MAPLE or MATLAB. The solution to these problems would be difficult and time-consuming without the use of MAPLE or MATLAB. On the other hand, the authors make effective use of these powerful languages, enabling their solutions to these nontrivial problems presentable in a classroom setting.

The authors intend the book as a text for students in scientific computing. It is not a text for learning MAPLE or MATLAB; rather, the authors assume that the reader is familiar with these languages.

The text had several contributors, from three university sources:

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Stanislav Barton (Brno), Joroslav Buchar (Brno), Ivan Daler (Brno), Walter Gander (ETH), Dominik Gruntz (ETH), Jürgen Halin (ETH), Jirí Hřebíček (Brno), František Klvaňa (Brno), Urs von Matt (ETH), and Jörg Waldvogel (ETH).

The text consists of 19 chapters, with each chapter presenting a different problem, and with the following titles providing reasonably informative descriptions of the contents:

1. The Tractrix and Similar Curves;
2. Trajectory of a Spinning Tennis Ball;