REVIEWS AND DESCRIPTIONS OF TABLES AND BOOKS

The numbers in brackets are assigned according to the American Mathematical Society classification scheme. The 1991 Mathematics Subject Classification can be found in the annual subject index of *Mathematical Reviews* starting with the December 1990 issue.

1[65-01, 65Lxx]—*Numerical methods for differential equations. A computational approach*, by John R. Dormand, CRC Press, Boca Raton, FL, 1996, x+368 pp., 24 cm, hardcover, $69.95

The motivation behind this book is to present numerical methods for ODEs from a practical, computational point of view, in a fashion readable by a wide audience including undergraduate students and engineers. (The author is well-known for his scientific work in this field, in particular concerning Runge-Kutta methods.) The book contains a very readable and practically oriented introduction to the relevant classes of one-step and multistep methods, including practically important topics like dense output, stepsize control, variation of stepsize in the multistep context and global error estimation. Stiff equations, second order equations and some PDE aspects are discussed in separate chapters. Quite a number of numerical examples are included.

I agree with the author's position that complete mathematical rigor is not the essential criterion for such a text. However, sometimes a deeper discussion would be desirable. Concerning one-step schemes, for instance, stability is mentioned only in the context of stiff problems. (We all know that stability for sufficiently small stepsizes is a simple and natural property of one-step methods. Nevertheless, such a text should more clearly explain this fact.) Concerning the stiffness phenomenon, I suspect that the author's explanation will not be very helpful to the beginner. On the other hand, lengthy derivations of various Runge-Kutta coefficient sets could rather be omitted.

A floppy disc with Fortran 90 sample programs is included. These are not designed to be very general or especially robust but are perfectly applicable (after some modifications, if necessary) to a wide range of standard problems. By the way, these codes illustrate how to make use of powerful Fortran 90 features like array operations or modules.

Notwithstanding the above comments, one may say the author has achieved his goal: The book gives a fairly complete overview on the relevant methods; it clearly explains how they behave and how they can be implemented and controlled.

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