

## 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.

**29[65-06, 65M60, 65N30]**—*Finite element methods: Fifty years of the Courant element*, M. Křížek, P. Neittaanmäki, and R. Stenberg (Editors), Lecture Notes in Pure and Applied Mathematics, Vol. 164, Dekker, New York, 1994, xxii+504 pp., 25 cm, softcover, \$165.00

In a 1943 paper ([1]), Richard Courant discussed the numerical solution of partial differential equations using piecewise linear functions on triangles. This paper is considered to be one of the earliest about the finite element method, and the triangular linear element is also known as the Courant element. To commemorate the fiftieth anniversary of the publication of this paper, a conference was held at the University of Jyväskylä, Finland in 1993. The book under review contains the proceedings of the conference.

Besides the reprinted aforementioned paper by Courant, there are 45 papers, which cover many different aspects of contemporary finite element research. Theoretical topics include domain decomposition methods, error estimators, locking, the maximum-angle condition, mesh orientation, mixed finite element methods ( $h$ -version,  $p$ -version, least-squares methods), parabolic variational inequalities, and superconvergence.

Various applications are also discussed in these papers, which include compressible flows, convection-diffusion problems, elasticity and viscoelasticity, the Helmholtz equation, Maxwell equations, Navier-Stokes equations, plates, porous media, shape optimization, shells, Stokes equations, thermal flows, and turbulence.

There are also three papers which are historical in nature. The first is a paper by I. Babuška, which surveys the history of the finite element method. It also contains the results of an opinion poll concerning the major achievements of the past and the important problems for the present and the future. The second is by L. A. Oganessian and V. Rivkind on finite element research in St. Petersburg, and the third is by V. Thomée on the development of finite element methods for parabolic problems.

Anyone who is working in the field of finite elements would certainly find some of the papers in this book interesting. This book will be a valuable addition to any library.

## REFERENCES

1. R. Courant, *Variational methods for the solution of problems of equilibrium and vibrations*, Bull. Amer. Math. Soc., **49** (1943), 1–23. MR 4:200e

S.C.B.