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.

6[65–01, 65Dxx, 65Fxx, 65Gxx, 65Hxx, 65Kxx].—GÜNTHER HÄMMERLIN & KARL-HEINZ HOFFMANN, *Numerical Mathematics* (Translated by Larry Schumaker), Undergraduate Texts in Mathematics, Springer, New York, 1991, xi + 422 pp., 23 $\frac{1}{2}$ cm. Price: Softcover \$39.95.

This is a straight translation of the first German edition (reviewed in [1]) incorporating, however, a few very minor corrections.

W. G.

1. W. Gautschi, Review **10**, Math. Comp. **55** (1990), 391–392.

7[35R30, 65M30, 93B30].—H. T. BANKS & K. KUNISCH, *Estimation Techniques for Distributed Parameter Systems*, Systems & Control: Foundations & Applications, Vol. 1, Birkhäuser, Boston, 1989, xiii + 315 pp., 23 $\frac{1}{2}$ cm. Price \$42.00.

A typical problem addressed in this book is the following: Given certain "observations" z of a "state" $u = u(x, t; q)$ which satisfies

$$(1)\qquad \begin{cases} u_t = (qu_x)_x \equiv A(q)u, & 0 < x < 1, \ 0 < t, \\ u(x, 0) = \phi(x), & 0 < x < 1, \\ \text{and boundary conditions}, \end{cases}$$

can one recover the unknown coefficient $q = q(x, t)$?

A typical general scheme for this problem is as follows: First, select a criterion for, hopefully, nailing down q; say, the "output least squares error criterion,"

$$(2)\qquad \underset{q}{\text{Min!}}\ |u(\cdot, \cdot; q) - z|^2.$$

Here, $|\cdot|$ denotes a suitable seminorm, e.g., the deviations at some discrete points (x_i, t_j). Then fix the "admissible parameter set" $\widetilde{Q}$, typically involving constraints on q motivated from the problem, e.g., $q(x, t) \geq \gamma > 0$, and perhaps even $q =$ constant. Some additional conditions, e.g., norm bounds, are also typically involved for making $\widetilde{Q}$ a compact subset of a suitable metric space. Then select finite-dimensional approximations Q_M to $\widetilde{Q}$, and also