12. *Applications to some differential equations* (38 pages): Several examples are given (a.o. Riccati and (almost) Euler-Cauchy) and a very recent method of solving the Riccati equation using *T*-fractions (due to S. C. Cooper) is treated.

MARCEL DE BRUIN

R. A. LORENTZ, *Multivariate Birkhoff Interpolation*, Lecture Notes in Mathematics, Vol. 1516, Springer-Verlag, 1992, ix + 192 pp.

Multivariate polynomial interpolation is a subject which always has attracted much attention, because it is basic in many other mathematical problems: finite elements, splines, cubature formulas, etc. Many papers and theses have been written on this subject in the last decade, but a clear convincing theory, accessible to practitioners, is yet to be achieved. Due to this, most of the textbooks on numerical analysis or approximation theory omit the problem or include only a few pages on it. There is a lack of books entirely devoted to the subject. The present book under review can be considered as a natural continuation of the book *Birkhoff interpolation* by G. G. Lorentz, K. Jetter, and S. Riemenschneider (Addison–Wesley, 1983), which deals with univariate Birkhoff interpolation problems, that is problems with derivatives of any order as interpolation data.

R. A. Lorentz presents his own research on the subject in a good part of the book and some other points of view in the rest, including a long list of references which, if not exhaustive, will be very useful to the reader. The first of the 13 sections is introductory and is followed by 6 others in which the author extends the univariate techniques to multivariate problems. After a section of examples from the theory of finite elements there are two sections (9 and 10) in which the results of the previous sections are applied to Hermite problems, that is problems with the same number of data at every node. In Section 11 several ways of computing Vandermonde-like determinants arising in multivariate interpolation problems are given. The last two sections deal with approaches where the dimension of the interpolation space is greater than the number of interpolation data and some extra conditions can be imposed in order to guarantee a unique solution.

The emphasis is on theoretical rather than practical aspects of the problems, more precisely on discussing if their solvability depends on the choice of the set of nodes and derivatives. Most of the interesting problems are almost regular; i.e., they are solvable for almost all choices of nodes. But it is difficult to identify in advance, in a practical way, the negative choices. Very few pages are devoted to constructive approaches, and the reader should not expect a collection of methods of solution for many problems. But this is a book, written in a very clear style, that every mathematician interested in multivariate interpolation must know.

MARIANO GASCA

E. M. NIKISHIN AND V. N. SOROKIN, *Rational Approximations and Orthogonality*, Translations of Mathematical Monographs, Vol. 92, American Mathematical Society, 1991, viii + 221 pp.

The concept of rational approximation forms the background of this book. In the framework of number theory it leads to classical Diophantine approximations, while in function theory it gives rise to Padé-type approximants. For the latter the notion of orthogonality plays a central role. This approach allows one to connect the theory of Padé approximants via the theory of orthogonal polynomials with different branches of mathematics such as operator theory and mathematical physics. Some additional techniques from the theory of boundary values of analytic functions and potential theory are the advanced tools of this investigation.