REVIEWS AND DESCRIPTIONS OF TABLES AND BOOKS

The numbers in brackets are assigned according to the American Mathematical Society classification scheme. The 1980 Mathematics Subject Classification (1985 Revision) can be found in the December index volumes of Mathematical Reviews.

23[33A65, 42C05].—C. BREZINSKI, A. DRAUX, A. P. MAGNUS, P. MARONI & A. RONVEAUX (Editors), *Polynômes Orthogonaux et Applications*, Lecture Notes in Math., Vol. 1171, Springer-Verlag, Berlin, 1985, xxxvii + 584 pp., 24 cm. Price \$42.00.

To help celebrate the 150th anniversary of the birth of Edmond Laguerre, a symposium on orthogonal polynomials was held on October 15–18, 1984, at Bar-le-Duc, the city of Laguerre's birth. With nearly a hundred registered participants, over seventy papers were presented on various aspects of orthogonal polynomials, their applications and several related topics. The proceedings for this conference reflect the remarkable renaissance the subject of orthogonal polynomials has enjoyed during the past two decades.

Sixty of the papers read at this meeting are included in the proceedings edited by the organizers of the symposium. Additionally, C. Brezinski contributes a biographical sketch of Laguerre while A. P. Magnus and A. Ronveaux discuss Laguerre's work with orthogonal polynomials and the connection of this work with contemporary research. J. Labelle contributes his "Tableau d'Askey." Many readers of this review are already familiar with this chart. For those who do not have access to a copy, its reproduction here will have to serve as an existence theorem since it appears in an eyeball-popping reduced size. For a more constructive approach to the information it contains, readers will have to write the author for a full size copy or else dig the information out for themselves from Andrews and Askey's contributed paper (described below).

There are four invited papers. J. Dieudonné provides a brief survey of the relevant aspects of the theory of positive definite J-fractions and Jacobi matrices and their connections with orthogonal polynomials and concludes with a short discussion of the Hamburger and Stieltjes moment problems. In between, he sandwiches a description of Laguerre's work with a problem in differential equations which led him to "his" polynomials.

W. Hahn next discusses formally orthogonal polynomials defined by a three-term recurrence formula which also satisfy a second-order linear differential equation. This leads to properties of a class of polynomials which are generalizations of the Classical orthogonal polynomials since the latter are characterized by being solutions of the familiar second-order Sturm-Liouville type differential equation.

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Richard Askey has long contended that applying the term "classical" to the "Classical" orthogonal polynomials of Jacobi, Hermite and Laguerre (and sometimes Bessel) results in too much attention (read "characterization theorems") being placed on too small a class of orthogonal polynomials. G. E. Andrews and R. Askey describe the various orthogonal polynomials which they contend should be included in any family called "classical." Their thesis is that the term "classical orthogonal polynomials" should apply to the special and limiting cases of certain ${}_4\varphi_3$ basic hypergeometric polynomials: the Askey-Wilson polynomials (née q-Racah polynomials) and their absolutely continuous analogues. The limiting cases which have ordinary hypergeometric representations are the basis for the classification which Labelle has summarized in his "Tableau d'Askey." Andrews and Askey contend that this is the largest class of orthogonal polynomials that have such nice properties as a Rodrigues type formula of the right form, and they challenge their readers to prove wrong their claim that they now have the "ultimate" extension of the classical orthogonal polynomials. A characterization theorem seems to be called for here.

The final invited address is by W. Gautschi, who discusses some new applications of orthogonal polynomials in Gauss-Christoffel quadrature, spline approximation theory, and summation of series. He also discusses the critical role played by the Askey-Gasper inequality in de Branges' proof of the Bieberbach conjecture. The author's own numerical calculations played an important role in convincing de Branges of the correctness of his approach and led Gautschi to contact Askey (with the resulting spectacular consequences).

The contributed papers are far too numerous to describe individually, but a listing of the topics by which they are grouped will indicate the wide range of subjects discussed: orthogonality concepts, combinatorics and graphs, function spaces, the complex plane, measures, zeros, approximations, special families, numerical analysis, applications, problems. It is perhaps worth mentioning, however, that one paper deals with a special case of the Freud conjecture, but D. S. Lubinsky, H. N. Mhaskar and E. B. Saff have recently announced settling the general case. All of this activity attests to the healthy state of a subject that seemed moribund a scant thirty years ago.

B. C. C.

24[35J60, 65N05, 65N10, 35B25].—PETER A. MARKOWICH, *The Stationary Semiconductor Device Equations*, Computational Microelectronics (S. Selberherr, Editor), Springer-Verlag, Wien and New York, 1986, ix + 193 pp., 25 cm. Price $45.00.

This book is a well-written, eminently readable introduction to the mathematical analysis of the stationary semiconductor device problem.

There are four serious chapters: Chapter 2 describes the source of the problem, various parameter models, geometric assumptions, and boundary conditions currently in use, and the possible scaling of the dependent variables.

Chapter 3 discusses existence, uniqueness, and regularity of the solutions, and has some interesting comments on the continuous dependence of the solution on the problem. The analysis proceeds primarily via maximum principle estimates and