including the connection with the sum of the residues), and the construction of the jacobian variety is sketched. The very last item is a cute proof that a real curve of genus g has at most $g+1$ topological components.

One sees that a lot of ground is covered, enough for a solid basic knowledge of the subject. The question arises whether this is the book, so long demanded by any number of mathematicians intrigued by certain of the applications of algebraic geometry but frightened by the formidable mechanism, that in a few well-chosen words makes things intelligible to the layman. This book certainly goes a long way toward such an improbable ideal. Perhaps twice as much material is included as would be advisable for such a purpose, but one can skip judiciously.

An essential bit of adverse criticism is occasioned by the author's generally breezy style, so appropriate to lecture notes and so conducive to compactness, which now and then (fortunately rarely!) makes some slurred argument, misprint, or misstatement all the more difficult to untangle. And the sketchy index is of too little help.

M. ROSENLICHT

Numerical analysis and partial differential equations. By G. E. Forsythe and P. C. Rosenbloom. (Surveys in Applied Mathematics, vol. V.) New York, Wiley, 1958. 10+204 pp., $7.50.

The two parts of this book are independent of each other and shall be described separately.

The article by Forsythe is a brief and very readable essay on the main problems of numerical analysis and on the kind of computing machines that are available to solve them. It will be of service to the practicing numerical analyst and at the same time it is a good introduction into the subject for a mathematically sophisticated novice. The problems described here are: (A) approximate quadrature, and best approximation to functions of one and several variables, least square fits; (B) solving simultaneous algebraic equations by Gauss elimination and, for sparse matrices, by iteration; the calculations of eigenvalues of matrices; (C) difference method for solving Laplace's equation and the associated eigenvalue problem.

There is a brief discussion of past, present and future methods for solving these problems, with an excellent guide to the literature, especially to articles in Russian.

Rosenbloom's survey of recent researches in the theory of linear partial differential equations is much longer and more ambitious.

Theorems are precisely stated and proofs are included if they are not too long; altogether this work is a suitable introduction into modern topics for someone already familiar with the classical parts of the theory.

In his choice of subject matter the author has concentrated on methods which are applicable to wide classes of equations rather than on methods which are adapted to special equations, even though the latter often yield more detailed results.

Chapter 1 contains the Cauchy-Kowalewski theory and an enlightening description of the Leray-Fantappié operational calculus. Chapter 2 contains the Holmgren-John uniqueness theorem, a brief outline of various kinds of theories of distributions and their use for partial differential equations, Fourier and Laplace transforms, operational calculus for differential operators including semigroup theory. Chapter 3 contains contributions of Hörmander, Malgrange, and Ehrenpreis to the general theory of partial differential equations with constant coefficients. Chapter 4 is a detailed account of various aspects of parabolic equations. Chapter 5 is about elliptic equations; it contains John's construction of a fundamental solution, Gårding's inequality for strongly elliptic systems and the L_2 existence theory for the Dirichlet problem, including regularity in the interior and up to the boundary. The Douglas-Nirenberg generalizations of the Schauder estimates is given, and some brief remarks on the construction of solutions and the distribution of eigenvalues and eigenfunctions. The last section deals with second order equations, includes the maximum principle, the Hölder and L_p estimates in a pre de Giorgi-Nash setting, i.e., under the assumption that (except in the two dimensional case) the coefficients of the second order terms are Hölder (or Dini) continuous.

There is a bibliography of 731 papers, many in Russian. Most of them are reported on in this book. This reviewer regrets that the beautiful works of Leray on energy integrals for hyperbolic equations and of Aronszajn on coerciveness are not described; they definitely belong here.

Rosenbloom states at several places that Weyl's lemma on harmonic functions has been anticipated by Zaremba. This is incorrect; rather, Zaremba's paper (well worth reading) anticipates the work of Bergmann-Schiffer and Picone-Fichera about projection into the space of harmonic functions. The use of the projection theorem of Hilbert space in this context has been supplied by Nikodym.

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