erality here adopted also has the disadvantage of making the book less suitable to be put in the hands of graduate students as their first introduction to the subject.

The concluding six chapters deal with modern developments. Renormalization is discussed using the original method by Dyson and Salam without recourse to the refinements introduced by Ward and Gupta. There is a chapter on damping theory, one on the S matrix, and in conclusion the theory of propagators developed by Umezawa and Visconti is discussed. This is one of several formulations of field theory in terms of renormalized quantities. The spirit of this section is that of "classical" quantum field theory. Little mention is made of path integrals, functional integrals, and the like. Perhaps these topics are not yet sufficiently understood for full treatment in a book but the picture is a little incomplete without them.

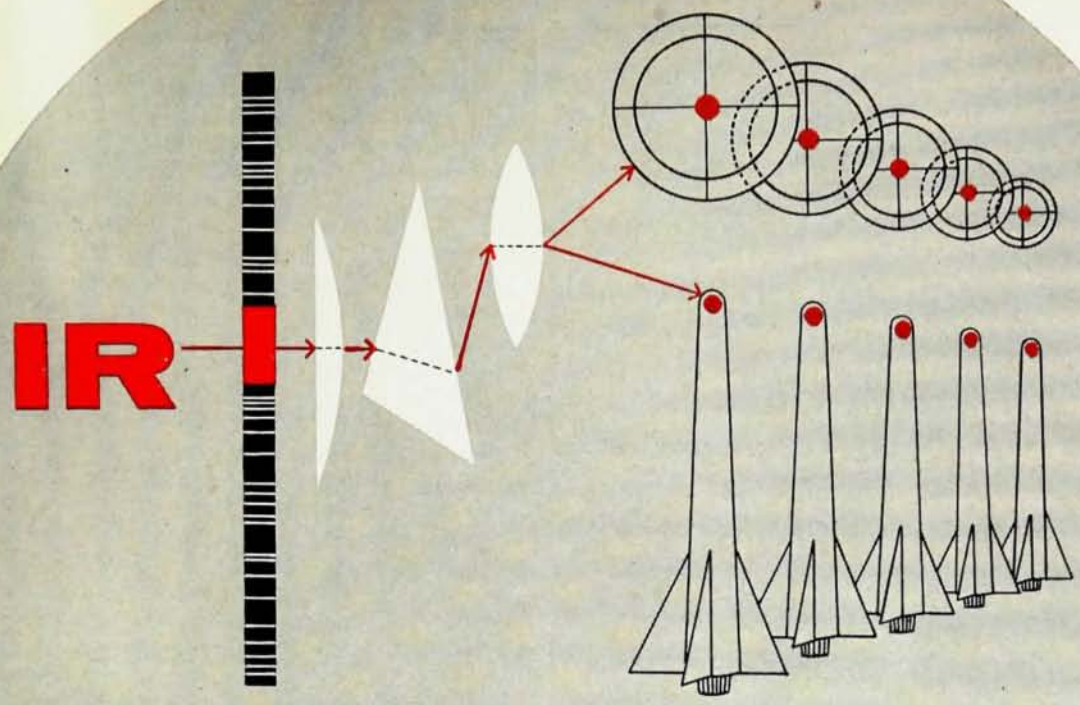
The book is carefully written and should serve as a useful reference work on the topics that it covers.

Elementary Differential Equations. By William Ted Martin and Eric Reissner. 260 pp. Addison-Wesley Publishing Co., Inc., Cambridge, Mass., 1956. $5.50. *Reviewed by T. Teichmann, Lockheed Aircraft Corporation.*

In these times when the abstract and formal approach in mathematics often seems to be the only respectable method of dealing with mathematical topics, it is most refreshing to come across a book like this one in which two first-rate mathematicians present an elementary approach to the subject of differential equations in which the student is allowed to attain a certain amount of feeling and intuition for the subject before being presented with the vast assemblage of formal theorems and facts.

This book is designed to be used by people who are interested in mathematics mainly for its application rather than for its intrinsic beauty but that does not mean that the mathematical niceties have been neglected. The treatment is correct throughout and is arranged in such a manner that simple problems and their solutions are given first and the student is allowed to understand what it is that exists before being confronted with an existence theorem.

After discussing the origin of differential equations and physical and geometrical problems and solving some of the simple first order ones which arise in this way, the authors go on to discuss the differential equation in the first order. Various methods of solution of such equations are presented and particular attention is paid to power series solution and to the problem of convergence of such solutions. Second order differential equations are then discussed including such techniques as series solutions, variation of parameters, and solutions around singular points. The Bessel function is used as a fairly extended example of the behavior of such solutions. A similar treatment is then given for higher order differential equations and in this case a short presentation of the Laplace transform method is given



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for such equations with constant coefficients. Systems of first order equations are then discussed in all the usual ways. At this point, the treatment becomes a little more sophisticated: approximate solutions of first order differential equations are discussed together with Picard's theorem. Problems of existence and uniqueness arise naturally at this stage of the discussion. The book then goes on to treatment of the finite difference equations showing methods of solution in the common cases and then deals with the approximation of differential equations by difference equations and comments on the manner in which error may arise in such an approach. The book concludes with a brief discussion of partial differential equations and solution of the equation of heat conduction solids using various different techniques in illustrating some properties of the solution. Short groups of exercises are included after almost every topic throughout the book.

In this reviewer's opinion, the authors have succeeded admirably in "contributing not only to the reader's knowledge of differential equations but also to his ability to think about problems of mathematical analysis in general" and they have also provided both a good foundation and a stimulus for further interest in the deeper or more abstract problems of differential equations.

Molecular Flow of Gases. By G. N. Patterson. 217 pp. John Wiley & Sons, Inc., New York, 1956. $7.50. *Reviewed by S. F. Singer, University of Maryland.*

At this time when so many trained in nuclear physics and atomic physics are turning their attention to classical physics, it is very good to have available a book which approaches gas dynamics from a molecular point of view. It is somehow more satisfying to know, even in macroscopic flow, something about the part which individual molecules and their unseen internal motions play. However, when the flow can no longer be treated by the usual methods and depends on the internal motions and often on the physical properties of the molecules, then a molecular approach is the only one which can be taken. Applications occur in the slip flow of highly rarified gases, in high-speed flight at high altitudes, and the properties of individual molecules are of great importance in flow at high Mach numbers.

The author starts with a molecular model, a simple sphere, and the Maxwell distribution law for velocities and derives from it the macroscopic properties of compressible, frictionless (isentropic) flow. With slight modifications the corresponding properties for a viscous compressible flow (slightly nonisentropic) are obtained. About half of the book is given over to applications of nonisentropic flows to weak shocks, boundary layer problems and similar topics, and to problems in the mechanics of rarified gases, for example the flow at low density and the effects of the molecular flow conditions on momentum and energy exchange. Transport phenomena are discussed from the same point of view.

The volume serves as excellent preparation for the