cules. Experimental and theoretical results covering absolute and relative intensities and line widths are discussed in some detail for a few representative molecules and references are given for others. The skeleton of concepts and the meat of individual data make up roughly the first half of the book. In the second half they are combined into a body which is then put to work on a variety of practical problems. A large amount of space is devoted to the theory of infrared emissivities, where the population of molecular levels is in thermal equilibrium. Since radiation is usually not in thermal equilibrium with matter this lack will in general also upset the thermal equilibrium of matter and this leads to a description involving several "temperatures" which is presented in two chapters on flames. Two final chapters deal with practical problems concerning solid and liquid propellants.

In approaching radiative transfer problems the author attempts to formulate a method which is based on hemispherical emissivities. These are directional averages which do not lend themselves very well to the formulation of an equation of transfer and in the attempt to overcome this deficiency the mathematics gets somewhat tangled up. There are mysterious factors cos θ which appear from nowhere. I have a feeling that there are some good ideas buried in this chapter but until someone cleans up the mathematics I shall continue to use the more standard methods as discussed for example in the writings of Chandrasekhar.

In the preface the author states that "in the selection of subject matter he has been strongly biased by the original researches performed by his own group. Nevertheless an effort has been made to prepare a coherent study." The extensive bibliography at the end of each chapter should prove very valuable in this respect. In addition to its use for the research scientists this book also is aimed at students in applied science and each chapter contains a number of problems. It appears to the reviewer that some of the so-called hints going with these problems are not very useful. One such hint, for example, refers to a technical report issued at the California Institute of Technology, and a student in a foreign country might have a hard time locating this reference.

This book definitely fills a gap which has been painfully apparent for some time. It should prove very valuable to research workers confronted with high-temperature problems which involve radiation.

Fluid Dynamics. By D. E. Rutherford. 226 pp. (Oliver & Boyd, England) Interscience Publishers, Inc., New York, 1959. $1.95. *Reviewed by J. Gillis, The Weizmann Institute of Science.*

THE University Mathematical Texts series has by now an established place in the mathematical education of undergraduates at British universities, but its usefulness extends over a very much wider field. This latest addition to the series is particularly welcome. It presents basic hydrodynamics in a refreshing way, combining mathematical rigor and exactitude with physical insight.

The book begins with the standard material on non-viscous incompressible flow. The welcome surprise follows in the form of a long chapter, indeed the longest in the book, on compressible flow. This includes linearized theory, a substantial discussion of shock waves, the Prandtl-Meyer expansion, the hodograph transformation, and many ancillary topics. The student familiar with the chapter may still be far from expert on compressible flow, but he will have many of the basic notions and will have a good idea of where and how to pursue the subject. The last chapter is devoted to a short and mainly qualitative account of boundary layer theory.

The Theory of Optimum Noise Immunity. By Vladimir A. Kotel'nikov. Translated from the Russian by R. A. Silverman. 140 pp. McGraw-Hill Book Co., Inc., New York, 1959. $7.50. *Reviewed by George L. Turin, Hughes Research Laboratories.*

THE American engineer is apt to be rather lacking in his knowledge of other languages and of foreign technical literature—especially so, sadly, if the language and the literature happen to be Russian. To this, and to the only recently diminishing unavailability here of Russian technical works, must be attributed the almost complete overlooking in this country of Kotel'nikov's important work on optimum communication systems. Originally a 1947 doctoral dissertation, and subsequently published (with minor modifications) in the USSR as a book, *The Theory of Optimum Noise Immunity* is now generally available in an excellent English translation. Only a brief scanning of the volume will convince the statistical communication theorist and the communication system engineer of the unfortunateness of the thirteen-year delay, for they will find that the author anticipated by several years much of the fundamental English-language literature in the field.

The book covers areas of what we should call the application to communication systems of hypothesis-testing and estimation theories, where the term "optimum noise immunity" refers to the minimization of an error criterion (probability of error, mean-square error). After a brief introductory section which presents the necessary mathematical tools, the remainder of the volume is devoted successively to the problems of digital communication, continuous-parameter transmission (e.g., telemetry), and waveform transmission and restoration. Those versed in modern communication theory will recognize many now-familiar concepts: the a-posteriori-probability computing receiver, minimum-variance parameter- and waveform-estimating receivers, geometrical (signal-space) models of communication systems, the sampling theorem, the noise-threshold effect, etc. Detailed general analyses of the performance capabilities of optimum communication systems are also presented, and the author, no pure theoreti-