fessor Judd's book offers a welcome balance of careful mathematics and suggestions for practical applications; it should serve for several years as a useful nucleus of an introduction to the interpretation of the experimentally accessible and frequently, clearly delineated spectra of lanthanides and actinides in ionic crystals.

Encyclopedia of Physics, Volume VIII/2, Fluid Dynamics II. S. Flügge and C. Truesdell, eds. 696 pp. Springer-Verlag, Berlin, 1963. DM 198.
Reviewed by Jacques Romain, Centre de Recherches Routières, Brussels, Belgium.

As would be expected in this collection, the volume under review is made of careful review articles by experts in their respective fields. This is the second volume devoted to fluid dynamics. In view of the quality of the contributions and of the presentation, it is well worthy of Flügge's *Handbuch*.

The first half of the book consists of a thorough and extensive review by R. Berker (in French) of the integration of the equations of motion of an incompressible viscous fluid. The author gives a systematic presentation and analysis of the exact and approximate solutions of the Navier-Stokes equations and of the simplified Stokes or Oseen equations, which are dispersed in the literature. This work is more oriented toward applications than Ladyzhenskaya's book recently reviewed in this journal.

A shorter German paper by J. Weissinger synthesizes the essentials of wing theory in the case of stationary motion in a frictionless incompressible medium.

The remainder of the book is written in English. Two papers deal with turbulent flow. One, by C. C. Lin and W. H. Reid, is a mathematical exposition of the statistical theory of turbulent flow, with the emphasis on the basic concepts and relations and on the so-called homogeneous turbulence. The second turbulent flow paper, by S. Corrsin, is concerned with a description of experimental methods and their limitations, including the generation of some "classical" turbulent flows; experimental details are omitted.

S. A. Schaaf deals with the mechanics of rarefied gases (low density, perfect gas effects) with the emphasis on problems of aerodynamic interest.

Finally, A. E. Scheidegger writes a paper (largely based on his recent book) on hydrodynamics in porous media, another field in which pieces of information are widely scattered. The article presents the general features of flow and hydrostatics in porous media and discusses the theories produced to fit the experimental facts and their limitations.

The bibliographical references are abundant. Most of the articles appear to be up to date as of 1960, which is the probable actual date of completion of the manuscripts. The reviewer has not been able to determine the motivation of the editors in providing a bilingual English-German subject index for the English and German contributions, and a separate French index for the first article.

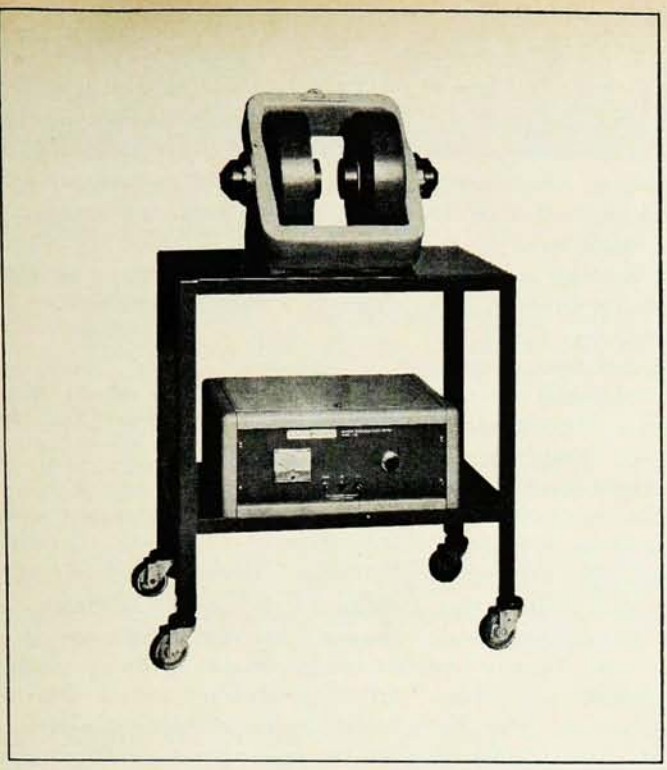
Advanced Computer Programming. A Case Study of a Classroom Assembly Program. By F. J. Corbató, J. W. Poduska, J. H. Saltzer. 170 pp. M. I. T. Press, Cambridge, Mass., 1963. $5.00.
Reviewed by William Siler, Memorial Hospital.

The remarkable infiltration of computers into the universities and laboratories has brought about an increasingly sophisticated attitude towards them on the part of scientists. Now that these electronic beasts are readily available, the problem of communicating with them is now almost as well known as the problem of communicating with Martians. Familiarity with the algebraic compiler languages such as Fortran, Algol, and Mad has become sufficiently widespread so that the deficiencies of these languages as well as their power are becoming known to more than a few. In consequence, development of new languages has become almost a parlor sport among the cognoscenti. For those cases in which existing languages are unsatisfactory and the development of a new language to solve a particular class of problems must be seriously considered, a working knowledge is needed of the inner mechanisms of compilers and assembly routines, the translators which convert a problem-oriented source language into the machine language of the computer itself. For those who expect to become involved in the creation or modification of a computer language, *Advanced Computer Programming: A Case Study of a Classroom Assembly Program* will serve as a more than adequate introduction. The official title, "Advanced Computer Programming", is a bit misleading; the reader who expects to find a general text on an advanced level will indeed be disappointed. The subtitle, "A Case Study of A Classroom Assembly Program", is highly accurate. The book contains 45 pages of text in which are explained in tightly written but comprehensible form the main features of an assembly program developed for use in formal courses at MIT using the IBM 7090 computer. For the teacher who wishes to use the book as a text, Appendix A gives in 120 pages a complete listing in FAP and machine language of the complete assembly program, an assembly output and a sample CAP language program, as well as a number of FAP assembly listings of "Programs to Allow Use of CAP in the Laboratory". Finally, there is an appendix with a number of suggested modifications to CAP for use as student problems.

The material is tied somewhat too closely to the particular system described, and an additional ten pages or so of text orienting the reader would have been valuable. Nevertheless, the reader seriously interested in compilers but with little or no experience will find the book very helpful. All others beware!

The Solar Corona. John W. Evans, ed. Internat'l Astronomical Union Symp. Proc. (Cloudcroft, N.M., Aug. 1961). 344 pp. Academic, New York, 1963. $14.00.
Reviewed by E. J. Öpik, Armagh Observatory and University of Maryland.

The corona accounts for only 10^{-15} of the sun's mass; yet, being the sun's external frontier, it controls corpuscular, short-wave ultraviolet, and x-ray radiations which permeate interplanetary space and play a decisive part in the physics of planetary ionospheres and in the phenomena of comet tails. The interplanetary gas is but an extension of the corona, blown away steadily or in gusts of the "solar



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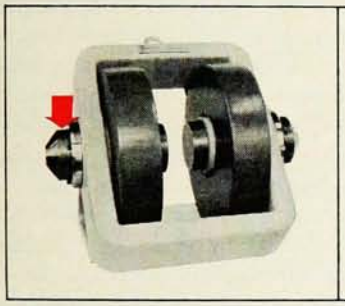

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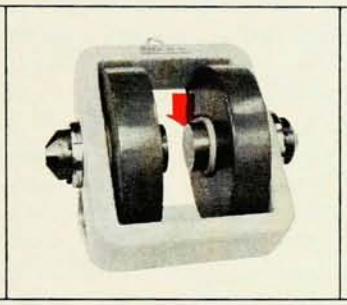

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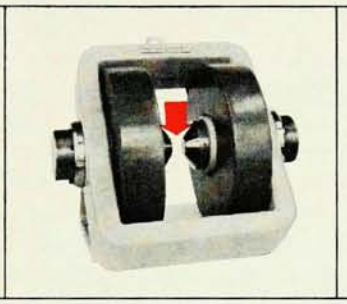

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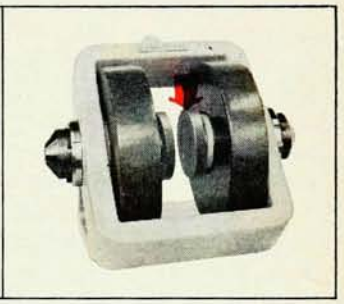

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wind". With a temperature of two million degrees, it generates radiations which the photosphere is unable to produce; yet its extreme tenuity prevents these radiations from reaching destructive levels.

A plasma of filamentary structure, betraying the rule of magnetic fields, it appears to be heated from below by shock waves into which subphotospheric turbulence degenerates upon reaching the tenuous upper strata. The source of its heating is one of the many mysteries of coronal physics and structure discussed in this volume by 47 expert authors from eleven different countries. The contributions range from brief abstracts to extensive memoirs; a Russian article alone contains 22 pages of a table of predicted short-wave spectral emission lines of atoms and ions. Theoretical treatises prevail, setting up more problems than solutions. As examples of observational highlights, the use of American rockets with pinhole cameras for x-ray pictures of the sun, and the French method of polarimetric registration of the corona in daylight could be mentioned.

The volume covers current problems of coronal theory and observation. With ample lists of literature, it is an important landmark, facilitating further study of the corona.

Electromagnetic Waves in Stratified Media. By James R. Wait. Vol. 3 of Internat'l. Series of Monographs on Electromagnetic Waves, edited by A. L. Cullen, V. A. Fock, J. R. Wait. 372 pp. Pergamon, London, 1962. Distr. in US by Macmillan, New York. $15.00.
Reviewed by H. J. Hagger, Albiswerk Zürich, Switzerland.

For studies in electromagnetic wave propagation in our terrestrial atmosphere, a model assuming a layer structure of the medium is very useful, especially for radio waves in the very low-frequency range (3 to 30 kc/s). J. R. Wait is a well-known research worker in this field, and the book reviewed is the outgrowth of courses in wave propagation given at the University of Colorado and the Technical University of Denmark.

Starting with some basic ideas and notation on Maxwell's theory, the author first considers the reflection of waves from horizontally stratified media, where solutions for the plane waves, and later on for cylindrical (line-source) and spherical waves (dipole), are developed. Some experimental data are also given. In Chapter 3 the variation of conductivity or dielectric constant is assumed to follow certain profiles, where solutions following an exponential or a power law can be found. In the next chapter, continuously stratified media are considered and various approximation procedures either for slowly varying profiles (WKB method) or for rapid variation (iteration process) are given. Propagation along a spherical surface (of both large and small curvatures) is treated, using Watson's method for large, and Bremmer's approach for small, radii (or very low frequency waves around the earth). In Chapter 6 the author gives the fundamentals of the mode theory of wave propagation over a flat earth with a sharply bounded ionospheric layer. Later in the chapter he discusses the influence of the curvature of the layers guiding the waves. At the end of this chapter a stratification of the ionospheric boundary layer is also considered. In Chapter 7 the mode theory is derived for the very low-frequency case with the aim of obtaining numerical results for attenuation, phase velocity, and dominant mode excitation. In the next chapter Wait deals with the very important case of stratified magnetoplasma media. He starts with the dielectric properties of a plasma, the reflection coefficient for a plane boundary between free space and plasma and then develops the theory for a stratified plasma and for an anisotropic ionosphere and makes some remarks on strongly ionized media and the energy dependence of the collision frequency. In Chapters 9 and 10, theoretical and experimental results on very low frequencies (3-30 kc/s) and extremely low frequencies (1-3000 c/s), respectively, are compared. In the next chapter the relationship between mode theory and ray theory is discussed. In the twelfth (and last) chapter Wait considers propagation in a stratified medium having a parabolic refractive index profile, a problem which is of great importance at ultrahigh frequencies.

The book is an excellent monograph on this subject, and a large number of references to each chapter and very helpful indices are given. It is a very theoretical treatise, but clearly written. It can be highly recommended as a reference book for all research workers in the field.

Physics and Chemistry of the Organic Solid State, Volume 1. David Fox, Mortimer M. Labes, Arnold Weissberger, eds. 823 pp. Interscience, New York, 1963. $25.00.
Reviewed by Stuart A. Rice, University of Chicago.

Following recent developments in molecular biology and solid-state physics, there has been a significant growth of interest in the study of the properties of organic crystals. The text under review consists of a series of articles by experienced investigators dealing with many aspects of the study of such crystals. No attempt has been made to collate in one volume articles which overlap and, for this, the editors are to be commended, since the volume has been published more rapidly than is typical of collections.

The articles vary considerably in quality. That by Craig and Walmsley on the visible and ultraviolet absorption spectra of molecular crystals is excellent and very readable. On the other hand, the article by Lions is disappointing.

The first article in the book, by Westrum and McCullough, deals with the thermodynamics of crystals. It gives a very good coverage of the field and cites approximately 800 pertinent references. There is some description of experimental techniques. In contrast to the thoroughness of this article, that by Sloan on the definition and attainment of purity in organic compounds is adequate but not detailed enough. Many different methods are discussed by Sloan, but too few examples are given to make the article truly useful. For example, tabular material on what substance A can be separated from what substance B and how much of substance A can be detected in substance B would have been very helpful.

Other articles deal with crystal growth, the structure of surfaces, plastic crystals, photochemistry, crystalli-