suggestion was practicable. Ten years later the director of research of the Air Ministry asked Robert Watson-Watt what he thought about the use of death rays for air defense. Watson-Watt, who had directed the study of radio noise and radio storm tracking since World War I, replied that it would be difficult to obtain damaging radiation effects at a distance but that it would be quite practical to detect and to track aircraft by means of radio pulses. The government gave immediate support. Within a month the concept had been tested, and within a year the first coastal warning stations were being designed. In the short 4 years before the start of World War II, early warning, ground control of interceptors, field army defense, air-to-ship, ship-to-ship, and air intercept radars were designed, tested, and put into production. From this beginning came the many other radar systems, radio beacons, and radio navigation systems which played such a vital role in the last war.

The Pulse of Radar is this story and the autobiography of Sir Robert. The two are intimately related. This is primarily the history of the British program, since that is the story the author knows personally and since the development of radar in the United States has been adequately glorified in other works. The British program is the really exciting one.

This volume has value not only as stimulating technical history but, perhaps even more, because of the light it sheds on the science-government-military relationships which made possible such dramatic progress. Even though the problems of military science are now much more complicated and the incentive may not be as great as it was then, still, much could be done to reduce the lead time for military research and development. Much can still be learned from the experiences described in this book.

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Les problèmes aux limites de la physique mathématique. Introduction à leur étude générale. H. G. Garnir. Birkhäuser, Basel, Switzerland, 1958. 234 pp. Illus. F. 29.

The simple Dirichlet problem is that of finding the temperature distribution in a solid when the temperature at the surface is prescribed; the Neumann problem differs only in that the heat flow across the surface, rather than the temperature itself, is prescribed. These problems are mathematically equivalent to those of finding a potential distribution when the potential at the surface is prescribed in the one case, the potential drop across the surface in the other. Either problem leads to that of finding a function u which satisfies

$$\partial^2 u/\partial x^2 + \partial^2 u/\partial y^2 + \partial^2 u/\partial z^2 = 0$$

throughout the region while at the boundary either the value of u itself or that of its normal derivative is prescribed. By including additional terms involving the function itself, and perhaps its first and second derivatives with respect to time, one obtains the mathematical conditions satisfied by the concentration of a solute diffusing through a solvent, the flux of neutrons in a nuclear reactor, the amplitudes of propagated waves, the displacement of an elastic medium subject to small perturbations—to mention only a few of the concrete applications. A powerful tool for the construction and study of the solutions of these problems is provided by the formation of a Green's function, which amounts to forming certain special elementary solutions which, when properly compounded, provide the solution actually required.

The monograph under discussion generalizes the problem to n dimensions and phrases the boundary conditions in more general terms, permitting, in particular, the Dirichlet condition to hold in certain areas and the Neumann condition to hold elsewhere along the boundary. The treatment is strictly modern, being phrased in terms of Hilbert spaces and utilizing Schwartz distributions. However, the necessary theory is developed at the outset, only a background in the theory of real and of complex variables, including some acquaintance with Fourier and Laplace transforms, being presupposed.

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Economics for the Mineral Engineer. Edmund J. Pryor. Pergamon, New York, 1958. 254 pp. Illus. $6.

Traditionally, the mineral beneficiation engineer has concerned himself with research and plant design. The problems of economics and management in the mining industry have been handled generally by those connected with development and ore production. Because of the ever-growing importance of ore concentration, this relationship is changing. It is essential that the mineral dresser of the future be well informed on the impact of costs, markets, and industrial relations.

There have been numerous books on mineral economics and mine valuation, all directed toward the geologist and the mining engineer. This is the first written specifically for the beneficiation engineer, or the mineral engineer, as he is called throughout much of the British Empire. Such a treatise is long overdue and should be of value to the teacher and student of ore treatment. The book is designed for the advanced student or the young engineer-supervisor aspiring to management, rather than for the undergraduate. The author is a lecturer at the Royal School of Mines, with managerial and consulting experience. His use of the "King's English" is exceptional—a definite advantage in educating our engineers to write well.

The opening chapters present a concise exposition on the prospecting and sampling of ore deposits. The coverage of accounting as it relates to economics is based on British methods and symbols, and this tends to confuse the American student somewhat. However, the presentation of specific data on mill records and mill construction are of particular value to the neophyte. A section on "new plants" offers practical and sound advice.

The real value of the book lies not so much in specifics as in the philosophies it expounds. This is particularly true in the coverage given management, labor relations, and professional ethics. Here are points too seldom presented to the engineer in his highly technical training. The enlightened view in personnel problems and the development of social conscience, particularly in foreign operations, are stressed as necessities.

Since the book touches briefly on many subjects and lists an ample number of references, it should stimulate additional reading on mineral economics. Some chapter revision seems warranted. Certainly "Incentive bonus" and "Hiring and firing" would be better under "Management" than under "Mill records." The "Glossary" is a definite contribution, containing definitions often hard to find.

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Introduction à l'étude des variétés kählériennes. Publications de l'Institut de Mathématique de l'Université de Nancago, VI. André Weil. Hermann, Paris, 1958 (order from Pierre Berès Inc., New York). 175 pp.

A surface, in Euclidean space, can be examined from (at least) two points of view. The Euclidean concept of distance induces, on the surface, a metric which has found its historical expression, in terms of local coordinates, by means of a quadratic differential form for arc length. On the other hand, Euclidean space can be embedded in complex projective space so that Euclidean geometry

becomes a branch of projective geometry.

These two points of view dominated the development of geometry during much of the 19th and early 20th centuries. Each made notable contributions to mathematical knowledge, but the paths of development were so divergent that the differential geometer and the algebraic geometer of 40 years ago often had little in common. Yet new concepts were quietly in the making; even though Kähler's original note, in 1933, created no great stir, today there are signs of a developing unity within geometry that attest to the importance of Kähler's concept and of recent work by Hodge, Kodaira, and others.

Although a Kählerian space, like the surfaces of classical differential geometry, carries a Riemannian metric, it is a complex analytic manifold rather than a sufficiently differentiable real one. In the second place, a Kählerian space induces in its tangent space (the space of differentials) a Hermitian geometry rather than an elliptic geometry. As a result, the class of Kählerian spaces includes not only the space of all linear subspaces (of a given dimension) of projective space but, more generally, any subspace which is algebraic and without multiple points.

Weil has done mathematics a great service, for his introduction to the subject should stimulate many mathematicians toward a more active interest in this new area of mathematics. His employment of the techniques of modern algebra and topology is effective and elegant. Of particular interest to the classical algebraic geometer is his treatment, in the final chapter, of theta functions and Abelian varieties.

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Nuclear Scattering. K. B. Mather and P. Swan. Cambridge University Press, New York, 1958. viii + 469 pp. Illus. $14.50.

The title of this book provides an accurate description of the contents. The authors begin with a brief sketch of the relationship between nuclear scattering information and nuclear forces. A considerable fraction (35 percent) of the book is then devoted to a description of experimental techniques used in charged-particle and neutron scattering experiments. The remainder of the book concerns itself with an extensive description of the analysis of nuclear scattering data, beginning with nucleon-nucleon scattering and extending to a discussion of the scattering by more complex systems using an optical model.

The chapter on the scattering of nucleons by few-nucleon targets provides a useful, concise review of past work in this area. The authors have also summarized certain aspects of high-energy scattering that have not heretofore appeared in book form. There is a very nice discussion (in one of the two appendices) of the way in which the scattering phase shift at zero energy measures the number of bound states in a potential.

It is not clear to me for what audience the authors intended their book. The 164 pages devoted to experimental technique, containing such information as the temperature dependence of the densities of Octoil S and Apiezon B (important as these may be), are not very conducive to keeping the reader's attention focused on the strength and range of the nuclear forces mentioned in the authors' opening remarks. Similar consideration is not given in the book to the problem of extracting reliable numbers from a high-speed digital computer! The treatment of complex systems is rather cursory. Although a great deal of discussion is devoted to stripping reactions, the fission reaction is not listed in the index. Almost no comment is made concerning recent data on either the average or the statistical properties of nuclear scattering widths and spacings. Heavy-ion scattering is also ignored.

Technically, the book is very good. Aside from a few misprints, it is easy to read, and the figures are clear. There are a few stylistic novelties, such as the use of *unreal axis* in place of *imaginary axis* and a carefully alphabetized reference to "Various authors." Because of the considerable amount of research work surveyed by this book, it will be a valuable addition to the research library of any institution engaged in nuclear physics. Considering the cost per page, probably most physicists will watch for it there.

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Nuclear Engineering Handbook. Harold Etherington, Ed. McGraw-Hill, New York, 1958. xv + 1857 pp. Illus. $25.

The growth in the number of university courses in nuclear engineering, the publication of textbooks on the subject, and hints of realistic cost estimates for nuclear power indicate that the field of nuclear engineering is approaching adolescence, if not maturity. The appearance of the *Nuclear Engineering Handbook* is another such sign—and a welcome one. This book provides some 1800 pages of useful, well-organized, and authoritative information, and is an excellent one-volume reference for the entire field.

There are 14 sections: "Mathematical data and general tables" (156 pages); "Nuclear data" (36 pages); "Mathematics" (148 pages); "Nuclear physics" (103 pages); "Experimental techniques" (145 pages); "Reactor physics" (121 pages); "Radiation and radiological protection" (142 pages); "Control of reactors" (88 pages); "Fluid and heat flow" (116 pages); "Reactor materials" (192 pages); "Chemistry and chemical engineering" (149 pages); "Nuclear-power-plant selection" (155 pages); "Mechanical design and operation of reactors" (155 pages); and "Isotopes" (58 pages).

It is, of course, impossible to discuss a handbook of this nature in detail in a brief review. The treatment is as up-to-date as the problems of compiling and publishing a handbook permit. The mistakes I have found during a quick survey of the book are such as could easily be corrected in a second edition. The coverage of the material is thorough. I have only one serious reservation with regard to content. There are many data not included in this volume; some can be found, in *Reactor Physics Constants* (ANL-5800), prepared at the Argonne National Laboratory and available at $7 or so per copy from the U.S. Government Printing Office, Washington, D.C. Examples of such data are constants for multigroup calculations; tables of reactivity versus reactor period; more calculation methods; and so on. I would like to see this additional information in future editions of the *Nuclear Engineering Handbook*, so that the cost of keeping up with advances in the field may be kept from multiplying too much.

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Modern Materials. Advances in development and applications. vol. 1. Henry H. Hausner, Ed. Academic Press, New York, 1958. xi + 402 pp. $12.50.

This volume is the first of a new series on modern materials. It has been prepared especially for the engineer with broad interests and for the specialist who wants information on materials other than those in his own field of specialization. In these days of rapid development of new materials the engineer has had to become more materials-minded and must therefore acquaint himself with the properties and commercial applications of the many new materials that come on the market.

The editor has assembled the following eight chapters: "Some new developments in wood as a material," by Carl de Zeeuw (59 pages and 11 references);