failures described provide a weak analysis of causes; much more authentic data are available in the numerous reports in the field of soil mechanics issued since 1930. It is out of the report of such failures that the new science of soil mechanics was born and developed. The author's grasp of this subject is less complete than his knowledge of construction techniques. Only a few spectacular dam collapses are described, yet the lesson of the Fort Peck failure is omitted. The discussion on arch-dam design seems out of context for this book. Similarly, the chapter on maritime structures gives us a good introduction to design and forces acting and a complete theory of wave action, but very few examples of the many sea-wall and groyne failures.

In the chapter on buildings, there are descriptions of five building failures in the United States, from 1901 to 1924. There are available many examples of more recent construction design and practice which would be of greater interest. (Strangely enough, no examples are given of building failures in the country —England—of this book's origin.) The description of the troubles with expansive clays (the author calls them "shrinkable clays") is not a complete story; much better information is found in the soil reports from Texas, Canada, and Southern Rhodesia.

Again, the chapter on bridges goes into great detail on the Quebec and Tacoma bridge collapses but misses the opportunity to teach the lessons of distress in small-bridge designs and of the typical erection failures.

The section on failures of underground structures includes a dissertation on the theme that soil is not a static material, and that tests of pressures are possible, but only two tunnel failures and one shaft failure are described, with no correlation to the theoretical discussion. Some mention should have been made of small-tunnel and conduit failures and of the recent Wilson Tunnel incident in Hawaii.

Vibration problems are well presented by the description of techniques of vibrograph recording of earthquake, blasting, and machinery effects, but the description of insufficiency in actual designs is not covered. Almost the entire chapter on welded structures is devoted to a discussion of steel metallurgy, brittle fracture, and metals of low fatigue strength. The description of welded steel ship failures is good—as is the author's vindication of the preference for welded over riveted ship design.

The concluding chapter has a misleading heading, since no lessons of failures are given. Instead, the author has described modern instruments for stress determination and for full-scale tests of structures. He has done an important service in opening up the literature on the subject but has not provided good coverage and has missed an opportunity to fill the gap in engineering knowledge.

It has been said that doctors bury their mistakes and architects plant ivy. Engineers write reports and then bury the lessons to be found therein.

JACOB FELD
New York, N.Y.

Elements of Partial Differential Equations. Ian N. Sneddon. McGraw-Hill, New York, 1957. 327 pp. Illus. $7.50.

Partial differential equations are a subject of greatest interest, both to mathematicians and to research workers in many fields of theoretical and applied science. In spite of this, the existing literature in the English language that is accessible to the nonspecialist in this field is scanty indeed. The book by Ian N. Sneddon, a worthy successor to the same author's book on Fourier transforms, will contribute much to filling this gap. It deals with Pfaffian systems, linear and nonlinear partial differential equations of the first order (including systems for one unknown function) and, briefly, with general equations of second and higher order, while the potential, the wave, and the diffusion equations are treated in separate chapters, with considerable detail. A large variety of methods, developed for the different types of problems and found in many separate treatises—such as reduction to ordinary differential equations by use of the characteristics; operational calculus; Fourier, Laplace, and other integral transforms; separation of variables and expansions in eigenfunctions; potentials with prescribed singularities; conformal mappings; integral equations; and direct methods of the calculus of variations—are discussed extensively or at least touched on in this book.

However, no systematic treatment of these methods is attempted. The author's aim is to take up only problems that have more or less explicit solutions and to concentrate on the methods only insofar as they yield these solutions in the most direct way. Very few complete proofs are given, but most methods discussed are illustrated by fully worked examples. Most of the problems, of which there are many in each section, are far from routine. Some of them extend the theory considered in the body of the text, others serve to show the manifold use of the general results.

Some readers will regret certain omissions and details of the treatment. One misses a general discussion of the reasonableness of the various initial and boundary-value problems (the concept of "correctly set problem" is not mentioned), a discussion of systems of equations like Maxwell's and Navier-Stokes', a general definition of Green's functions and elementary solutions and of the characteristics as branching strips, and many other general concepts. There are few uniqueness theorems, the eigenvalue problem so important in the theory of vibrating media is hardly mentioned, and numerical methods are ignored. Nevertheless, the merits of this book are so obvious that its wide use as a textbook for students and as a source book for research workers in many fields of science can be safely predicted.

MICHAEL GOLOMB
Purdue University

The Sun. Giorgio Abetti. Macmillan, New York, 1957 (translation J. B. Sidgwick of 1954 revised edition). 336 pp. Illus. + plates. $12.

The first edition of *The Sun* by Giorgio Abetti has been a standard reference book for 15 years. The present edition, although it follows the general style and form of the first, is completely rewritten. New theories of the sun and new techniques for observing it are described in detail, but earlier achievements of historical interest are not neglected.

Abetti reviews faithfully, although necessarily briefly, what has been written about the sun in all languages through the years. His presentation is factual. It is an unprejudiced, noncritical statement of observational and theoretical accomplishments and may not seem exciting enough to those who like to have everything presented with a positiveness beyond its worth. The following quotation from the end of the chapter on the theories of the sun's constitution illustrates his conservative approach: "The theories that we have been glancing at are still speculative, and it cannot be said that a complete explanation of the complex phenomena of the Sun has yet been evolved." Not a single chapter is dominated by the pet theories of the author.

The second edition, like the first, was written in Italian, Abetti's native tongue, and the translator has preserved the full flavor of the author's style.

The Sun, illustrated with many photographs and drawings, is not a technical book; it can be read and enjoyed by anyone interested in undramatized details about the sun and about the men and instruments that brought these details to light. Its value as a reference book would be increased by a longer bibliography, but as a self-contained solar encyclopedia, *The Sun* will be difficult to excel.

SETH B. NICHOLSON
Mount Wilson and Palomar Observatories