of waves in the case where both the plasma density and magnetic field are inhomogeneous with the associated phenomenon of reflexion and absorption of these waves in certain critical cases.

An interesting feature of the book is the admirable collection of examples (of which there are nearly one hundred) at the end of each chapter. Some contain hints for the proof of theorems enunciated in the text, others serve as useful illustrations of points discussed therein. There is also a comprehensive bibliography. The author is to be congratulated on this excellent treatise, and every plasma physicist will feel indebted to him for this. It will surely find a place on the library shelves of every serious student of plasma physics.

V. C. A. FERRARO

SOLVING FIELD PROBLEMS

Analysis and Computation of Electric and Magnetic Field Problems

By K. J. Binns and P. J. Lawrenson. Pp. xiv + 333. (London and New York: Pergamon Press, 1963.) 84s. net.

FREQUENTLY an engineer or physicist has to solve a field problem involving complex mathematical analysis. More often than not it is difficult to find someone who can understand the problem and advise on the best way of solving it. Although the situation is improving it is still a rare department that has a highly competent engineer–mathematician on its staff who can advise others on the best methods for tackling specific problems.

This book goes a long way towards providing many of the answers that are required. It is directed at practising engineers and physicists, as well as students seeking a better understanding of field problems. The standard of mathematics required to start reading the book is within the syllabus of a normal engineering degree; where more advanced mathematical topics are introduced, they are fully explained in the text. Throughout the book the emphasis is on the physical significance of the mathematics, and to this end practical examples are used wherever possible.

The book is divided into four parts. Part 1 serves as an introduction to the rest of the book; it deals with basic field theory and the methods of calculating force, inductance and capacitance from a knowledge of the field distribution. Part 2 is concerned with images and direct methods of solution, much along the lines of the book by Hague. However, in addition, attention is directed to the solution of the Laplace equation in Cartesian coordinates, and where the method of images is used the solutions are expressed in a convenient complex variable form.

The largest part of the book, Part 3, deals with transformation methods, and the authors claim that their treatment of the subject is the most comprehensive available. This certainly appears to be so, for in the five chapters in this part the authors present in a most clear and concise fashion a vast amount of transformation theory. The first chapter in this section presents the basic transformation theory leading up to the transformation equations. The second chapter is concerned with curved boundaries and the following chapter with polygonal boundaries. There follows a chapter on the application of elliptic functions and finally one on general considerations. Of particular interest in this third part are the treatments of line and doublet sources, the transformation of regions exterior to finite polygonal boundaries and a most useful technique for the direct numerical integration of functions of a complex variable, which permits solution of problems involving boundaries of greater complexity than is otherwise possible.

In Part 4, the powerful finite-difference methods are discussed. Again, the treatment is from first principles,

and practical problems serve as examples for the application of the techniques evolved. The practical advice on the actual methods to be adopted is most useful. The section devoted to convergence and the optimum choice of parameters to provide the most rapid convergence possible for any given problem is probably the best so far available anywhere in the literature. Other topics include gradient boundary conditions and errors. In the conclusion to this part, the authors make the point that if a digital computer were used, it might be possible to reach the solution to a problem much more quickly by means of finite-difference methods than by analytical methods—that is, if an analytical solution exists anyway.

The appendixes include a useful list of transformations, many of which have not previously been published. These, for the most part, involve elliptic functions.

Every chapter ends with two lists of references. The first refers to specific points in the text, and the second indicates related literature which could be of interest. In addition, at the end of the book, an extensive bibliography is included.

Even if one knows a method for solving a specific problem one would be well advised to look within the covers of this book to ensure that no better method exists for the solution. This is an excellent volume, which is certain to prove most popular. The authors are to be congratulated.

E. M. FREEMAN

PHOTOCHEMISTRY

Advances in Photochemistry

Vol. 1. Edited by W. Albert Noyes, jun., George S. Hammond and J. N. Pitts, jun. Pp. ix + 443. (New York and London: Interscience Publishers, a division of John Wiley and Sons, 1963.) 125s.

DURING the past few years, there has been a rapid rise in the number of *Progress in . . .*, *Advances in . . .*, *Aspects of . . .*, and other such series about various topics in chemistry. As a result, with any new series of this general type, the reviewer must not only consider the merits of the particular volume being discussed, but also whether the series itself fulfils any real need.

The growth of virtually all aspects of photochemistry has been particularly marked during the past fifteen years. This has undoubtedly been as much due to the development of new analytical techniques (for example, gas chromatography) as to developments in spectrometers and progress in spectroscopy generally. Considerable advances have been made in the elucidation of mechanisms of many photochemical reactions and progress has also been made in determining the nature of the intermediate excited states resulting after the absorptions of radiation. A surprising number of compounds obtainable only with extreme difficulty by conventional synthetic procedures can now be made simply by photochemical methods, and often on quite a reasonable scale. Indeed, the first really large-scale manufacture of materials using a photochemical reaction has recently been undertaken.

Few of these developments have yet appeared in chemical text-books, and surprisingly few works specifically devoted to photochemistry exist. While several reviews and articles on various photochemical topics have been published, they are very widely scattered. Thus we see that there is little doubt of the real need of a series of reviews on photochemistry.

Volume 1 of *Advances in Photochemistry* consists of nine chapters, and contains, in addition, author and subject indexes. The first chapter on "The 'Vocabulary' of Photochemistry", by J. N. Pitts, jun., F. Wilkinson and G. S. Hammond, deserves to be read not only by all practising and intending photochemists but also by