chosen at the discretion of the computer in such a way as eventually to make all the residuals vanish. The changes in the various residuals which occur with each change in a function value are made immediately on the net diagram.

Southwell's exposition of the actual computational procedure will be confused for many readers by his insistence on a mechanical analogy in which everything is expressed in terms of 'externally applied loads,' 'string tensions,' 'residual forces,' and the like. For such readers an excellent exposition of the procedure by Emmons (*Quart. appl. Math.*, 1944, **2,** 173) will be useful.

The very power of Southwell's method for handling problems *of whatever type* lies in the fact that *no* definite procedure is given for relaxing the residuals—one is only sure that if by hook or by crook he can get them relaxed, he has solved the problem. It is comfortable and convenient to have a definite procedure for 'relaxing the residuals' such as is given by the 'iteration' procedure, which has seen considerable development in recent years, but only for certain classes of linear, elliptic, partial differential equations. (See G. Shortly, R. Weller, P. Darby, and E. H. Gamble. *J. appl. Phys.*, 1947, **18,** 116, and earlier papers referred to therein. It is pointed out that the 'difference function,' the function 'relaxed' by the iteration procedure of these authors, is closely related to, although not identical with, Southwell's 'residual.') Southwell makes no comment on this procedure, but Emmons does, and it seems appropriate in a review of Southwell's book that some comparison be made for cases where the iteration procedure has been developed. Emmons gives a time comparison in which he says that a certain simple heat-conduction problem on a coarse, 19-point net took him 1.75 hours to solve by the relaxation procedure and the fantastic time of 11 hours "by the method of Shortley and Weller. . .with the use of a calculating machine" (*Trans. A.S.M.E.*, 1943, **65,** 607). The reviewer can only assert that the same problem took him exactly 26 minutes to solve by the last-named method, starting with the same plane trial function as Emmons and without the use of a calculating machine. It is his opinion that the 'iteration' procedure is certainly more convenient and probably more rapid than the 'relaxation' procedure in cases to which it has been applied.

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Elementary theory of gas turbines and jet propulsion. J. G. Keenan. London: Oxford Univ. Press, 1946. Pp. viii+261. (Illustrated.)

The title of this book is aptly chosen. Volumes could be written on the theory of gas turbines and jet propulsion, but the author has produced a work for the benefit of the average scientific reader. The book will appeal to those who wish to become somewhat acquainted with the theory but who lack the mathematical and thermodynamic background necessary for a more rigorous treatment. With this clientele in mind, the author has avoided the concept of entropy and has based the theory entirely on pressure-volume relations.

By way of introduction the early history of the gas turbine is reviewed. Various components, such as nozzles, combustion chambers, diffusers, etc., are treated individually. The author has effectively arranged the material by first defining such technical terms as are pertinent to the discussion and then applying these concepts to the various types of turbines, compressors, and jets.

The centrifugal and axial-flow compressors are discussed with reference to velocity diagrams, work per stage, losses, efficiency, intercooling, and compressor characteristics. The impulse and reaction turbines are discussed very briefly under similar headings. A chapter is given to heat transfer, since that topic is so intimately associated with gas turbine and jet engine development.

Actual data on performance of this type of equipment are rather meager; however, graphical material is given to show the effect of pressure ratios, reheating, and compounding, and to show the thermodynamic limitations as well as the present stage of development. The various types of jet motors are pictured with their operating cycles shown on pressure-volume axes. The effect of such variables as altitude and air density on performance is given. The last chapter describes installations in which the various forms of turbines and jet motors have found application.

The book is well illustrated and is easily followed. It will fill a present-day need as envisioned by the author.

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La scissione nucleare dell'uranio: fenomenologia generale. Emidio Prata. Milan: Ulrico Hoepli, 1946. Pp. 160. (Illustrated.) Lire 250.

After a few pages of introduction on nuclear reactions, the author describes the experiments that led to the discovery of fission (Chap. 1). Chapter 2 lists the identified fission products; Chapters 3 and 4, the mass distribution of fission fragments and their ranges in gases. Chapter 5 includes a detailed discussion of the stability of the nucleus against fission, the treatment following essentially the well-known papers of Bohr and Wheeler. Chapter 6 is a discussion of the instantaneous and delayed neutron emission in fission, from both theoretical and experimental standpoints. There follows a discussion of various cross sections for nuclear reactions (Chap. 7) and of the time within which fission occurs (Chap. 8). The conditions for a self-sustaining chain reaction and details on the chain-reacting pile as given in the Smyth report are given in Chapter 9. A complete bibliography of publications on fission from 1934 to 1943, including 325 titles, is given at the end of the volume.

The book constitutes a practically complete résumé of all the work on fission published in scientific periodicals up to 1943, plus a brief summary of additional information released by the Manhattan District after the war. The subject is competently treated, and apparently no essential data available at the time of publication are omitted. The book is evidently intended primarily for the physicist who is not a specialist in nuclear problems and who wishes to become acquainted with the essentials of the fission process. At the same time, it can be used profitably as a reference work by the nuclear physicist himself, the complete bibliography making it particularly valuable in this respect.

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