La Méthode du Champ Self-Consistent. By L. Brillouin. (Actualités Scientifiques et Industrielles, No. 71.) Paris, Hermann, 1933. 46 pp.

This monograph explains a method of approximating a solution of the many body problem in wave mechanics which was given first by Hartree. The problem is to find the wave function appropriate for a system of electrons under the influence of several fixed nuclei and of one another; the method is to represent the desired wave function as a product of separate wave functions, each of which depends only on one of the electrons. Each of these factor wave functions is found by supposing the corresponding electron to move under the influence of the fixed nuclei and a field obtained by averaging the fields of all the other electrons. An account of the modifications due to the "spin" of the electrons and of Pauli's exclusion principle is given.

The treatment is authoritative, and, despite the little space at his disposal, the author does not shirk the essential and obvious difficulties of the problem.

F. D. MURNAGHAN

Fundamentals of Hydro- and Aeromechanics, based on Lectures by L. Prandtl. By O. G. Tietjens (translated by L. Rosenhead). New York, McGraw-Hill, 1934. xvi+270 pp.

This and a companion volume which is reviewed below form the first of a series of monographs known as Engineering Societies Monographs to be published under the auspices of several of the American Engineering Societies. The purpose of the book is to give an account of the theory of hydrodynamics which is as simple and as closely related to experience as possible. No attempt is made to treat the advanced mathematical theory, for which reference is made to Lamb's classical treatise. Part I, pages 1–65, treats hydrostatics and discusses such matters as the equilibrium of gas-filled balloons, temperature effects, surface tension. Part 2, pages 69–104, describes the Lagrangian and Eulerian methods of treatment and gives a brief and intuitive account of the necessary vector analysis. Part 3, pages 107–265, treats the dynamics of non-viscous fluids ending with a brief chapter descriptive of Stokes' treatment of a viscous fluid and referring to Oseen's improvement. Two-dimensional problems and the theory of vortices are treated quite fully and there is a welcome discussion of the effect of compressibility.

The whole book breathes the spirit of the engineer and numerical calculations are frequently given; whenever a formula yields results not in accord with experimental facts the fallacy in the assumptions made is clearly pointed out. It is our opinion that the book fulfills its purpose admirably and it can be highly recommended as a complement to Lamb's work.

F. D. MURNAGHAN

Applied Hydro- and Aeromechanics, based on Lectures by L. Prandtl. By O. G. Tietjens (translated by J. P. Den Hartog). New York, McGraw-Hill, 1934. xvi+311 pp.

This book together with its companion volume, reviewed above, is one of the new series of Engineering Societies Monographs. After a very brief recapitulation of the fundamental laws and a chapter on the laws of similarity, an ex-

tended discussion of problems in hydraulics (flow in pipes and channels) is given (in which references to quite recent work are made). Then follows a good account of the Prandtl boundary layer theory and a discussion of resistance (Stokes' theory, Karman vortices, etc.). The theory of airfoils is amply treated (it being pleasant to see the credit given to Lanchester's pioneer work). The book closes with a chapter on experimental methods and apparatus and an appendix containing some sixty-eight photographs made by the author of various types of flow.

We strongly recommend this work to any student of practical hydrodynamics. As in the case of the companion volume, one interested mainly in the mathematical theory will have to look elsewhere.

F. D. MURNAGHAN

Les Calculs Formels des Séries de Factorielles. By J. Ser. Paris, Gauthier-Villars, 1933. vii+98 pp.

This book has to do with series, such as

$$f_0 - \sum_{n=1}^{\infty} f_n \frac{x(1-x)\cdots(n-1-x)}{1\cdot 2\cdots n},$$

arising in connection with the table of successive differences of the values of a function $f(x)$ for equally spaced values of x. A large number of transformations of these series, and of expansions of particular functions in the series, are given. The treatment is entirely formal, there being only a few passing remarks about questions of convergence. Nothing in the way of a theory is developed; the contents consist chiefly of a collection of special calculations.

Even when due allowance is made for the restrictions that have been imposed intentionally on the subject matter, the book remains rather unsatisfactory. As there is no index, and as the subdivisions of the chapters have no titles, it is difficult to use the book for reference purposes. In many places, because of the lack of full explanations, the meaning is obscure. There are no references to the literature, and there are many typographical errors.

L. A. MACCOLL

Le Mystère et le Paradoxe du Vol Animal. By Émile Batault. Paris, Gauthier-Villars, 1933. 14+236 pp.

Sur l'Excédent de Puissance des Oiseaux. By A. Magnan and A. Planiol. Paris, Hermann, 1933. 25 pp.

Sur l'Excédent de Puissance des Insectes. By A. Magnan and A. Planiol. Paris, Hermann, 1933. 26 pp.

It must have been from the flight of birds that man first conceived the ambition to fly. And it was natural to believe that the solution of the problem lay in the study and imitation of animal flight. The student of the history of science is familiar with the drawings that Leonardo da Vinci made of wing-like appliances for man's use. The difficulty in the problem was that of power. The perfection of the gasoline motor and the screw propeller gave an entirely new approach to the question. As a result the flight of airplanes and the flight of birds differ in fundamental ways, and in consequence the latter has lost some of its interest. As a natural phenomenon, however, the flight of birds is still