BOOK REVIEWS

GUREVICH, M. I., *The Theory of Jets in an Ideal Fluid* (Pergamon Press, Oxford, 1966), viii+412 pp., £5.

Any book on the theory of jets has to be considered in relation to the existing standard work on the subject, namely *Jets, Wakes and Cavities* by G. Birkhoff and E. H. Zarantonello (Academic Press, New York, 1957). This latter work gave exhaustive references to western research and was written by and primarily for mathematicians. Professor Gurevich has now provided a text which covers the standard theory, introduces the reader to the many fascinating applications for which it has been used, and gives a long list of references, particularly valuable in that it draws attention to the considerable Russian effort in this field, much of which has appeared in publications since the time when Birkhoff and Zarantonello's book was written. The mathematical demands on the reader are quite modest, and this new text should commend itself to research workers wishing to obtain as simply and quickly as possible an idea of the scope and techniques of jet theory. What is lacking in the book, however, is a serious discussion of the limitations and successes of the theory, in the framework of the true physics of the problems considered.

The book begins with the special contributions associated with the names of Kirchhoff, Joukovskii and Chaplygin to the study of flows by means of the theory of functions of a complex variable. Many examples are given in the ensuing chapters of free jet efflux, of flows past straight-walled and curvilinear obstacles, and of such useful mathematical fictions as the re-entrant jet, a device designed to deal with the flow pattern behind a body, where simple free-streamline assumptions lead to drag coefficients that are wildly inaccurate. By widening the definition of "jet" so as to include the internal free surfaces of cavitating flows, the author permits himself to include in the discussion flows of infinite lateral extent and flows in channels.

The last of the chapters on two-dimensional steady flow concerns the flow past planing surfaces and submerged aerofoils, the classical undetermined problem of impinging jets, jets from the detonation of hollow charges, and some other problems of practical interest which do not appear in the standard reference books.

There is an interesting account of research on unsteady flows, and the author points out the present unsatisfactory state of knowledge on the stability of jet flows. His chapter on jet flows in a compressible fluid is restricted to a résumé of Chaplygin's use of the hodograph plane with some generalisations and some examples of the simplifications that have been made to the adiabatic relation in a gas in attempts to obtain mathematical solutions more readily than the full theory will allow. There is a chapter on axisymmetric flows, in which Trefftz's numerical method of solution of the integral equation for the velocity potential with non-linear boundary conditions is treated in detail, because of its general character, and the law of expansion at infinity of axisymmetric jets is derived. The book ends with a chapter on jet flow in a heavy fluid.

This new book does not replace that of Birkhoff and Zarantonello as a standard work, but complements it in many ways. Research workers and advanced students will find it a most useful addition to their libraries.

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