

*Hydrodynamics*. Report of the Committee on Hydrodynamics, National Research Council: Hugh L. Dryden, Francis D. Murnaghan, H. Bateman. Washington, National Research Council, 1932. 634 pp.

When one thinks of hydrodynamics, Lamb's invaluable treatise nearly always comes first to the mind. But the hydrodynamics of Lamb is mainly that of an ideal fluid, and there is more emphasis placed on getting satisfactory mathematical solutions of the various problems considered than there is on getting solutions that correspond to the results of observation. As Lord Rayleigh once remarked, "It is little wonder that practical men should declare that theoretical hydrodynamics has nothing at all to do with real fluids." The development of mechanical flight in particular, and other applications of fluid motion, in recent years, have made the study of real fluids a matter of great importance. An actual need existed for a comprehensive survey of what has already been accomplished in modifying the classical treatment of hydrodynamics so as to bring theory closer to experiment. The National Research Council is to be congratulated on their selection of authors, who have so admirably performed this service.

The opening chapter of this Report is contributed by Dryden, who gives a general view of the need for such a work, discusses the principle of dynamical similarity, and shows the significance of the Reynolds number in all cases of the flow of real fluids.

The second chapter, by Murnaghan, is mainly concerned with the calculation of the forces on aero-foils obtained by conformal transformation from a circular cylinder moving in a perfect fluid with circulation. This is a subject which is only briefly touched upon by Lamb. The treatment has many points of novelty, and copious references are given to the original sources.

The remainder of the volume, about six-sevenths of the whole, is contributed by Bateman. First there is a chapter on the physical properties of a viscous fluid with an excellent discussion of the experimental methods of determining the coefficient of viscosity. Then follows the mathematical theory of the motion of viscous fluids, and an application to those problems which have thus far been brought within the scope of the theory. The boundary layer theory of Prandtl receives an adequate treatment. The subjects of turbulent flow, and the influence of compressibility on the motion of viscous fluids, complete the Report. It would serve no useful purpose to attempt to give here an account of all the topics that are discussed. The physical interest is always kept in view, and there is constant reference to experimental results. One must be amazed at the encyclopaedic knowledge of the author and his industry in gathering together and assimilating such a wealth of material. There are nearly two thousand different names listed in the index. Of course by no means all of them are referred to in the text, but references are given to their writings.

Except for an account of the present state of the theory of shock waves, or waves of discontinuity, in compressible fluids, the subject of wave motion, which forms nearly half of Lamb's treatise, is not included in this Report.

This Report is an important contribution to the subject of hydrodynamics, and it will be found to be of the greatest value by all who are interested in the newer developments of the subject.

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