to the unresolved experimental data than are nonlinear effects. However, determining the limits of validity of singular perturbation theory is an important part of freeing fluid dynamics from its heuristic past. Shear-flow turbulence (O. M. Phillips) is an "elementary" problem that one expects will remain an annual review topic for many years. Phillips applies quasilinear theory to rationalize aspects of the energy-releasing processes and to test his enriched "eddy viscosity" model. Recent studies by L. N. Howard and F. Busse, which are not reviewed, provide an alternative, and more quantitative, route to the exploration of turbulence energetics.

Biophysical fluid dynamics is included in a thorough review of blood flow studies (R. T. Jones) and a superbly synthesized assessment of aquatic animal propulsion (M. J. Lighthill). Lighthill concludes that we can understand the evolutionary shaping of fish and marine mammals from known principles without resort to any mysterious control of drag by these animals. An article on surface-tension-driven phenomena (V. G. Levich and V. S. Krylov) is not specifically addressed to biological problems, but certainly can be of value to the biophysicist.

Planetary fluid dynamics reviews include recent work on buoyant plumes (J. S. Turner), the fascinating behavior of nonviscous stratified flows (C.-S. Yih), shock waves and radiation (Ya. B. Zel'dovich and Yu. P. Raizer), and electrohydrodynamics (J. R. Melcher and G. I. Taylor). Applications of shock wave theory range from studies of melting transitions in solids to the emission of x-rays from neutron starts—that is, they range from tested deductions to implausible speculation. Electrohydrodynamics is the study of flows induced by coulomb forces. In the review critical comparison is made of analytical models of waves, convection, and instability with experiments in weakly conducting laboratory fluids. One foresees numerous applications in both biophysics and astrophysics.

The editors promise survey articles on geophysical fluid dynamics (flow in rotating systems, tides, and atmospheric boundary layers) in a forthcoming volume. I hope they can include more of the recent work on nonlinear flow and nonlinear stability theory.

WILLEM V. R. MALKUS
Department of Mathematics,
Massachusetts Institute of Technology,
Cambridge

Weak Turbulence

Theory of Turbulent Plasma. A. A. VEDENOV. Translated from the Russian edition by Scripta Technica. S. Chomet, Transl. Ed. Iliffe, London; Elsevier, New York, 1968. 128 pp. $5.50.

Modern plasma physics, it is generally conceded, began with the controlled thermonuclear reactor programs initiated in the U.S., the U.S.S.R., and elsewhere in the early 1950's. A major preoccupation of the next ten years was the problem of plasma stability. This period saw a considerable development, based upon linearized theories, of our understanding of how plasmas unstably amplify small amplitude waves. An International Atomic Energy Agency conference on controlled thermonuclear fusion, held in 1962 in Salzburg, marked the beginning of a new important phase. Three papers, two American and one Russian, laid the foundation of weak-turbulence theory, wherein the effects of various instabilities are analyzed. (In many cases, the nonlinearities in plasma turbulence are weak, permitting use of the extensive body of linear theory and elegant perturbation schemes.) A rapid development of formal weak-turbulence theory followed, particularly in Russia. Now we have available three monographs—Kadomtsev's *Plasma Turbulence* (Academic Press, 1965), Sagdeev and Galeev's *Nonlinear Plasma Theory* (Benjamin, 1969), and Vedenov's *Theory of Turbulent Plasma*, under review here—by some of the leading Soviet weak-turbulence theoreticians which reflect the state of Russian understanding in 1966. Regrettably, this knowledge is still not completely disseminated in the U.S. Several things have happened since 1966, such as the increased interest in large amplitude single waves, which are not completely covered in these volumes. In addition, there are very few references to experimental verifications of weak-turbulence theory. For these reasons, these monographs are unlikely to become authoritative reference books. Their greatest value is in training theoretical intuition about various nonlinear plasma processes. The books are essential for advanced graduate students and researchers primarily because of their elegant presentation of the Russian philosophy of plasma physics.

Vedenov's book has several important virtues. First and foremost is its spare simplicity. The author has eschewed complicated or controversial topics to concentrate upon simple derivations of fundamental processes. He presents intuitive and simple derivations of many basic instabilities so that students will not be lost in the later sections devoted to their nonlinear consequences. In the nonlinear discussion, Vedenov stresses only the basic processes and their theoretical structure such as the quasilinear theory and mode-coupling. The nonlinear analysis of various instabilities are more thoroughly discussed in the Sagdeev and Galeev book. The nonlinear wave-particle interaction, such as nonlinear Landau damping, treated in both Kadomtsev's and Sagdeev and Galeev's books, is completely omitted here. Despite these omissions, this is an excellent introduction, for whatever is treated here is presented with elegance and lucidity. Physical concepts, and not mathematical techniques, are emphasized throughout. For these reasons, then, this book is in some ways the most accessible of the three to students. Of course, it may be said that Vedenov's arguments are so sophisticated that his book is deceptively simple; nevertheless it is simple.

CHARLES F. KENNEL
C. S. LIU
Department of Physics,
University of California,
Los Angeles

Progress Reports in Meteoritics

Meteorite Research. Proceedings of a symposium, Vienna, Aug. 1968. PETER M. MILLMAN, Ed. Springer-Verlag, New York; Reidel, Dordrecht, Holland, 1969. xvi + 944 pp., illus. $48. Astrophysics and Space Science Library, vol. 12.

Current research on the origin and history of meteorites is represented by 73 papers delivered to this symposium sponsored by the International Atomic Energy Agency. The majority of the papers clearly are progress reports, containing new data which raise as many new questions as they offer solutions to problems and which give few final answers.

The discussion sessions included Early History of Meteorites, Composition and Structure (5 sessions), Isotope Studies and Chronology (3 sessions), and Orbits. These broad topics are closely interrelated, and papers in all sessions have bearing on the central problems of meteoritics, which remain unsolved. For instance, new Monte Carlo calculations