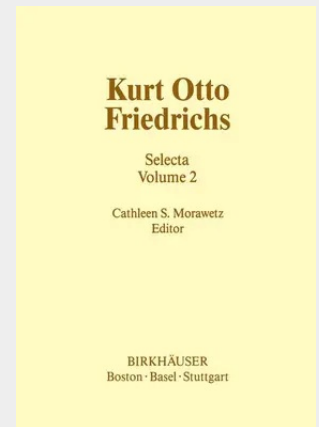


Kurt Otto Friedrichs

Selecta Volume 2

The work presented in this report originated in connection with a research project in magneto-hydrodynamics conducted by Professor H. Grad at the Institute of Mathematical Sciences at New York University; the report was completed while the author was a consultant at Los Alamos Scientific Laboratory. The report contains an expository analysis of the mathematical structure of magneto-hydrodynamic theory; specifically, of the theory of the interaction of magnetic fields with conducting compressible fluids. One of the major aims is to emphasize the remarkably close parallelism between this theory and ordinary gas dynamics. While hydromagnetic shocks and small disturbance waves have been treated before, it seems that hydromagnetic 'simple waves' are here treated for the first time. In a typical example it is shown that - as in gas dynamics - simple one-dimensional flow problems can be solved with the aid of shocks and simple waves. Throughout the exposition a familiarity with the basic notions of gas dynamics - covered e.g. by the first three chapters of *Supersonic Flow and Shock Waves* - is presupposed. The bibliography refers only to those papers which are concerned with the subjects treated. No reference is made to a number of significant contributions to hydromagnetics concerned with subjects - such as astro- and geophysical applications, effect of turbulence, stability questions - which are not covered in this report.

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213,99 €

199,99 € (zzgl. MwSt.)

Lieferfrist: bis zu 10 Tage

Artikelnummer: 9780817632694

Medium: Buch

ISBN: 978-0-8176-3269-4

Verlag: Birkhäuser

Erscheinungstermin: 01.01.1986

Sprache(n): Englisch

Auflage: 1. Auflage 1986

Serie: Contemporary Mathematicians

Produktform: Gebunden

Gewicht: 1332 g

Seiten: 608

Format (B x H): 183 x 260 mm

