Fundamentals of Plasma Physics is a rigorous explanation of plasmas relevant to controlled fusion, astrophysical plasmas, solar plasmas, magnetospheric plasmas, plasma thrusters, and many other plasma applications. More thorough than previous texts, it exploits new, powerful mathematical techniques to develop deeper insights into plasma behavior.

The initial chapters develop the basic plasma equations from first principles and explore single particle motion with particular attention to adiabatic invariance, a concept that later recurs in many contexts. The author then examines the many types of plasma waves and the philosophically intriguing issue of Landau damping. Magnetohydrodynamic equilibrium and stability are then tackled with emphasis on the topological concepts of magnetic helicity and self-organization. More advanced topics follow, including magnetic reconnection, nonlinear waves, and the Fokker–Planck treatment of collisions. The book concludes by discussing non-neutral and dusty plasmas, and considers how these unconventional plasmas relate to conventional plasmas.

Written for beginning graduate students and advanced undergraduates, this text emphasizes the fundamental principles that apply across many different contexts. It is of interest to students and researchers in physics, astronomy, space physics, electrical engineering, and aeronautics.

Front cover illustration: magnetohydrodynamically driven plasma jet undergoing kink instability. Courtesy of S. C. Hsu and P. M. Bellan.

CAMBRIDGE
UNIVERSITY
www.cambridge.org

ISBN 0-521-82[illegible]

9 780521 821162

Cover designed by Hart McLeod