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issue of Landau
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that apply across many
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of the important applications of plasma physics to energy production and to the understanding of our space environment. In magnetic confinement fusion, this period has seen the attainment of a Lawson number nTE of $2 \times 10^{21} \text{ cm}^{-3} \text{ sec}$ in the Alcator tokamaks at MIT; neutral-beam heating of the PL T

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tokamak at Princeton to $K_{Ti} = 6.5$ keV; increase of average β to 3%-5% in tokamaks at Oak Ridge and General Atomic; and the stabilization of mirror-confined plasmas at Livermore, together with injection of ion current to near field-reversal conditions in the 2XII β device.

Invention of the tandem

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mirror has given magnetic confinement a new and exciting dimension. New ideas have emerged, such as the compact torus, surface-field devices, and the EBT mirror-torus hybrid, and some old ideas, such as the stellarator and the reversed-field pinch, have been revived.

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concepts describe cold gas-discharge plasmas, space plasmas, and hot fusion plasmas. Starting from particle drifts in magnetic fields, the principles of magnetic confinement fusion are explained and compared with laser

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fusion. Collective processes are discussed in terms of plasma waves and instabilities. The concepts of plasma description by magnetohydrodynamics, kinetic theory, and particle simulation are stepwise introduced. Space charge effects in

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sheath regions, double layers and plasma diodes are given the necessary attention. The novel fundamental mechanisms of dusty plasmas are explored and integrated into the framework of conventional plasmas. The book

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concludes with a concise description of modern plasma discharges. Written by an internationally renowned researcher in experimental plasma physics, the text keeps the mathematical apparatus simple and emphasizes the

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underlying concepts. The guidelines of plasma physics are illustrated by a host of practical examples, preferentially from plasma diagnostics. There, Langmuir probe methods, laser interferometry, ionospheric

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sounding, Faraday
rotation, and

diagnostics of dusty
plasmas are

discussed. Though
primarily addressing
students in plasma
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plasmas and
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Probe techniques
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basic theory and a
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examples for probe
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Yukawa balls,
phase transitions
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section on
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electrical asymmetry effect in capacitive rf-discharges is described. The text is based on an introductory course to plasma physics and advanced courses in plasma diagnostics, dusty plasmas, and plasma waves, which the author

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then moves on to apply this understanding to waves and instabilities in a fluid plasma, and finally introduces the kinetic theory of plasmas and re-examines waves and instabilities from the kinetic viewpoint. Many

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*aerospace
technology are
introduced in the
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electric propulsion
in space and low-
pressure
microwave
electric
discharges,
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*current increase in
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and the wide
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trophysics, it
makes sense for
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*become a part of
an undergraduate
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experience, along
with subjects like
thermodynamics
or quantum
mechanics.*

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primary purpose
of this book was to
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*text that seniors
or juniors can
really understand,
I hope it can also
serve as a
painless way for
scientists in other
fields-solid state
or laser physics,
for instance to
become
acquainted with*

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plasmas. Two guiding principles were followed: Do not leave algebraic steps as an exercise for the reader, and do not let the algebra obscure the physics. The extent to which these opposing

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*aims could be met
is largely due to
the treatment of a
plasma as two
interpenetrating
fluids. The two-
fluid picture is
both easier to
understand and
more accurate
than the single-
fluid approach, at*

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*least for low-
density plasma
phenomena.*

*The growing
number of
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requires that graduate students and professionals understand their principles. This introductory book is the expanded version of class notes of lectures I taught for several years to students of Aerospace

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book does not follow the usual organization of standard textbooks in this field and is divided in two parts. The first introduces the basic kinetic theory (molecular collisions, mean

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free path, etc.) of neutral gases in equilibrium in connection to the undergraduate physics courses. The basic properties of ionized gases and plasmas (Debye length, plasma frequencies, etc.)

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*collisions
(elementary
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between
electrons' ions
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equations for

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models of interest

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derived. The plasma production in the laboratory in the context of the physics of electric breakdown is also discussed. Finally, among the myriad of aerospace applications of plasma physics,

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