



Basic Space Plasma Physics

By Wolfgang Baumjohann, Rudolf Treumann

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This textbook deals with the requirements of space physics. The first part starts with a description of the Earth's plasma environment, followed by a derivation of single particle motions in electromagnetic fields, with applications to the Earth's magnetosphere. Then the origin and effects of collisions and conductivities, formation of the ionosphere, magnetospheric convection and dynamics, and solar wind-magnetosphere coupling are discussed. The second part of the book presents a more theoretical foundation of plasma physics, starting from kinetic theory. Introducing moments of the distribution function permits derivation of the fluid equations, followed by an analysis of fluid boundaries, with the Earth's magnetopause and bow shock as examples. Finally, fluid and kinetic theory are applied to derive the relevant wave modes in a plasma. A representative selection of the many space plasma instabilities and relevant aspects of nonlinear theory is given in a companion textbook, Advanced Space Plasma Physics, by the same authors.

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Editorial Review

Review

.."the book is still one of the best addressing space plasma physics."

From the Inside Flap

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The revised edition seamlessly integrates new sections on magnetospheric reconstruction, as well as instability and thermal fluctuations based on new developments in space physics. Applications such as the important problems of collisionless reconnection and collisionless shocks are covered. Some problems have also been included at the end of each chapter.

A representative selection of the many space plasma instabilities and relevant aspects of nonlinear theory is given in a companion textbook, Advanced Space Plasma Physics, written by the same authors.

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