

Engineering Magnetohydrodynamics

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Suitable for advanced undergraduates and graduate students in engineering, this text introduces the concepts of plasma physics and magnetohydrodynamics from a physical viewpoint. The first section of the three-part treatment deals mainly with the properties of ionized gases in magnetic and electric fields, essentially following the microscopic viewpoint.

Engineering Magnetohydrodynamics - Dover

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Engineering Magnetohydrodynamics (Dover Civil and ...

Magnetohydrodynamics (MHD) is a combination of fluid mechanics and electromagnetics concerned with the motion of electrically-conducting liquids and gases in the presence of a magnetic field. Examples of technical applications are electric power generation, electromagnetic pumping and propulsion as well as control of moving molten metals.

Magnetohydrodynamics | Thayer School of Engineering at ...

Magnetohydrodynamics (MHD; also magneto-fluid dynamics or hydromagnetics) is the study of the magnetic properties and behaviour of electrically conducting fluids. Examples of such magnetofluids include plasmas, liquid metals, salt water, and electrolytes.

Magnetohydrodynamics - Wikipedia

Suitable for advanced undergraduates and graduate students in engineering, this text introduces the concepts of plasma physics and magnetohydrodynamics from a physical viewpoint. The first section of the three-part treatment deals mainly with the properties of ionized gases in magnetic and electric fields, essentially following the microscopic viewpoint.

Engineering Magnetohydrodynamics by George W. Sutton ...

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In addition, he earned a Master of Science and Doctor of Philosophy in Aerospace Engineering from the Georgia Institute of Technology in May 2015 and August 2019, respectively. Hisham's current research interests are in space systems, magnetohydrodynamics, hypersonics, and plasma physics.

Seminar: Magnetohydrodynamics and Planetary Entry - Nov. 6 ...

MAGNETOHYDRODYNAMICS by M. S. Tillack and N. B. Morley The authors wish to acknowledge the generous extraction of material on gaseous MHD power generation from the previous edition, authored by John C. Cutting.

MAGNETOHYDRODYNAMICS

A finite-difference study of a steady, incompressible, viscous, magnetohydrodynamic (MHD) channel flow which has direct application to dc electromagnetic pumps is presented. The study involves the numerical solution of the coupled Navier-Stokes and Maxwell equations at low magnetic Reynolds numbers. It is shown that the axial velocity profiles have a characteristic M shape as the fluid ...

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Engineering Aspects of Magnetohydrodynamics. Proceedings ...

An introduction to engineering magnetohydrodynamics, this brief focuses heavily on the design of thermo-magnetic systems for liquid metals, with emphasis on the design of electromagnetic annular linear induction pumps for space nuclear reactors. Alloy systems that are liquid at room temperature have a high degree of thermal conductivity far ...

Thermo-Magnetic Systems for Space Nuclear Reactors: An ...

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Engineering magnetohydrodynamics (Book, 1965) [WorldCat.org]

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Suitable for advanced undergraduates and graduate students in engineering, this text introduces the concepts of plasma physics and magnetohydrodynamics from a physical viewpoint. The first section of the three-part treatment deals mainly with the properties of ionized gases in magnetic and electric fields, essentially following the microscopic viewpoint. An introduction surveys the concepts of ionized gases and plasmas, together with a variety of magnetohydrodynamic regimes. A review of electromagnetic field theory follows, including motion of an individual charged particle and derivations of drift motions and adiabatic invariants. Additional topics include kinetic theory, derivation of electrical conductivity, development of statistical mechanics, radiation from plasma, and plasma wave motion. Part II addresses the macroscopic motion of electrically conducting compressible fluids: magnetohydrodynamic approximations; description of macroscopic fluid motions; magnetohydrodynamic channel flow; methods of estimating channel-flow behavior; and treatment of magnetohydrodynamic boundary layers. Part III draws upon the material developed in previous sections to explore applications of magnetohydrodynamics. The text concludes with a series of problems that reinforce the teachings of all three parts.

This book is an introductory text on magnetohydrodynamics (MHD) - the study of the interaction of magnetic fields and conducting fluids.

Magnetohydrodynamics, or MHD, is a theoretical way of describing the statics and dynamics of electrically conducting fluids. The most important of these fluids occurring in both nature and the laboratory are ionized gases, called plasmas. These have the simultaneous properties of conducting electricity and being electrically charge neutral on almost all length scales. The study of these gases is called plasma physics. MHD is the poor cousin of plasma physics. It is the simplest theory of plasma dynamics. In most introductory courses, it is usually afforded a short chapter or lecture at most: Alfvén waves, the kink mode, and that is it. (Now, on to Landau damping!) In advanced plasma courses, such as those dealing with waves or kinetic theory, it is given an even more cursory treatment, a brief mention on the way to things more profound and interesting. (It is just MHD! Besides, real plasma physicists do kinetic theory!) Nonetheless, MHD is an indispensable tool in all applications of plasma physics.

Magnetohydrodynamic Electrical Power Generation Hugo K. Messerle University of Sydney, Australia The global demand for energy continues to grow. Magnetohydrodynamic (MHD) conversion processes offer a highly efficient, clean and direct conversion of energy for power generation and propulsion. By converting the kinetic energy of a flowing fluid into electricity directly, MHD systems help address the problems of environmental pollution. At the same time MHD is particularly suitable for primary energy sources or fuels providing energy at temperatures extending far beyond those manageable by any conventional thermal conversion plant. It therefore offers a potentially more effective utilisation of fossil and nuclear fuels. The author covers all aspects of MHD power generation, including the design and operation of MHD conversion systems in practice. Features include: A comprehensive introduction to the principles behind the interaction of magnetic field and electric currents with electrically conducting fluids in the conversion of energy. Coverage of all aspects of generator configurations, as well as the disk generator, multi-phase converters, and propulsion systems. Study of the design for AC power generation, covering the control and power conditioning of the generator and the integration of such designs into existing power systems. Study of the use of MHD plant as part of a topping cycle combined with a steam and/or gas turbine or ternary cycle potentially leading to combined cycle efficiencies of up to 60%. Relevant worked examples in each chapter to assist the reader with self-study and the understanding of the topic. This text will appeal to advanced students in power engineering, physics and mechanics. Practising engineers and scientists in the field of power technology will find it an excellent practical reference and a basis for developing ideas on large scale MHD processes. Magnetohydrodynamic Electrical Power Generation forms a part of the Energy Engineering Learning Package. This innovative distance learning package has been established to train power engineers to meet today's and tomorrow's challenges in this exciting field. Organised by a team of distinguished, international academics, the modular course is aimed at advanced undergraduate and postgraduate students, as well as power engineers working in industry. World Solar Summit Process

Provides a comprehensive review and usable problem-solving techniques for aerospace engineering plasma applications.

Magnetohydrodynamics (MHD) plays a crucial role in astrophysics, planetary magnetism, engineering and controlled nuclear fusion. This comprehensive textbook emphasizes physical ideas, rather than mathematical detail, making it accessible to a broad audience. Starting from elementary chapters on fluid mechanics and electromagnetism, it takes the reader all the way through to the latest ideas in more advanced topics, including planetary dynamos, stellar magnetism, fusion plasmas and engineering applications. With the new edition, readers will benefit from additional material on MHD instabilities, planetary dynamos and applications in astrophysics, as well as a whole new chapter on fusion plasma MHD. The development of the material from first principles and its pedagogical style makes this an ideal companion for both undergraduate students and postgraduate students in physics, applied mathematics and engineering. Elementary knowledge of vector calculus is the only prerequisite.

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