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Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Review of Scalars, Vectors, Tensors, and Dyads -- Mass Conservation and the Equation of Continuity -- The Equation of Motion -- Energy Flow -- The Electromagnetic Field -- Closures -- Conservation Laws -- Ideal MHD and the Frozen Flux Theorem -- Resistivity and Viscosity -- Similarity Scaling -- The W#x00F6;ltjer Invariants of Ideal MHD,

Topological Invariance, Magnetic and Cross-Helicity -- Reduced MHD -- Equilibrium: General Considerations#x2014; The Virial Theorem -- Simple MHD Equilibria -- Poloidal Beta, Paramagnetism, and Diamagnetism -- #x201C;Force-Free#x201D; Fields -- Toroidal Equilibrium; The Grad#x2013;Shafranov Equation -- Behavior of Small Displacements in Ideal MHD -- Linearized Equations and the Ideal MHD Force Operator -- Boundary Conditions for Linearized Ideal MHD -- Proof that the Ideal MHD Force Operator is Self-Adjoint -- Waves in a Uniform Medium: Special Cases -- Waves in a Uniform Medium: Arbitrary Angle of Propagation -- The Calculus of Variations and the Ideal MHD Energy Principle -- Examples of the Application of the Energy Principle -- The Rayleigh#x2013;Ritz Technique for Estimating Eigenvalues -- The Gravitational Interchange Mode or -Mode -- Comments on the Energy Principle and the Minimizing Eigenfunction -- Examples of the Application of the Energy Principle to Cylindrical Equilibria -- A Very Brief and General Tour of Suydam Analysis for Localized Interchange Instabilities -- Magnetic Reconnection -- Steady Reconnection: The Sweet#x2013;Parker Problem -- Resistive Instabilities: The Tearing Mode -- Resistive Instabilities: Closing Remarks -- Turbulence -- MHD Relaxation: Magnetic Self-Organization -- Dynamos: Magnetic Field Generation and Maintenance.

Sommario/riassunto

This concise and self-contained primer is based on class-tested notes for an advanced graduate course in MHD. The broad areas chosen for presentation are the derivation and properties of the fundamental equations, equilibrium, waves and instabilities, self-organization, turbulence, and dynamos. The latter topics require the inclusion of the effects of resistivity and nonlinearity. Together, these span the range of MHD issues that have proven to be important for understanding magnetically confined plasmas as well as in some space and astrophysical applications. The combined length and style of the thirty-eight lectures are appropriate for complete presentation in a single semester. An extensive appendix on extended MHD is included as further reading.