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	Equations; 2.2.2 Lagrangian Form of the Moment Equations; 2.2.3 Fluid Equations: Necessity of a Closure Equation; 2.2.4 Collisional Limit: Fluid Dynamics and Thermodynamics; 2.3 Numerical Methods; 2.3.1 Vlasov Codes; 2.3.2 Particle in Cell Codes (PIC); 2.3.3 Perturbative PIC Codes; 2.4 Fluid Codes; 2.5 Hybrid Codes 3 The Magnetized Plasmas3.1 Ideal MHD; 3.1.1 The Ideal MHD System; 3.1.2 The Ideal Ohm's Law; 3.2 Establishing the MHD Model; 3.2.1 Large-Scale Conditions of Validity; 3.2.2 Departures from MHD: Multi- Fluid and Kinetic Effects; 3.3 Dimensional Analysis and Plasma Characteristic Scales; 3.3.1 Dimensional Analysis: The General Methods; 3.3.2 Temporal and Spatial Scales, Adimensional Numbers; 3.3.3 Dispersive and Dissipative Effects; 3.3.4 Physical Importance of the Dimensionless Parameters; 4 Collisional-Collisionless; 4.1 Notion of Collisions in Plasma Physics 4.1.1 Coulomb Interaction: A Long Range Interaction4.1.2 Mean Free Path; 4.1.3 The Debye Length and the Notion of Debye "Screening"; 4.1.4 Knudsen Number; 4.1.5 Plasma Regimes; 4.2 Notion of Dissipation; 4.2.1 Transfers of Energy and Dissipation; 4.2.2 The Concept of Dissipation in Collisional Fluids; 4.2.3 Reversibility; 4.2.4 Irreversibility and Damping; 4.2.5 The Notion of Reversibility Depends on the Description; 4.2.6 Entropy; 5 Waves in Plasmas; 5.1 MHD Waves; 5.1.1 Polarization of the MHD Waves; 5.1.2 Application: Alfven and MHD Waves in the Earth's Magnetosphere 5.2 Transport Induced by Waves
Sommario/riassunto	Collisionless Plasmas in Astrophysics examines the unique properties of media without collisions in plasma physics. Experts in this field, the authors present the first book to concentrate on collisionless conditions in plasmas, whether close or not to thermal equilibrium. Filling a void in scientific literature, Collisionless Plasmas in Astrophysics explains the possibilities of modeling such plasmas, using a fluid or a kinetic framework. It also addresses common misconceptions that even professionals may possess, on phenomena such as "collisionless (Landau) damping". Abundant illustration