

<<等离子体天体物理学,第一部分>>

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## <<等离子体天体物理学,第一部分>>

### 内容概要

为有力推动我国物理学研究、加快相关学科的建设与发展，特别是展现近年来中国物理学家的研究水平和成果，北京大学出版社在国家出版基金的支持下推出了《中外物理学精品书系》，试图对以上难题进行大胆的尝试和探索。

《中外物理学精品书系·引进系列·等离子体天体物理学（第1部分）：原理与实践（影印版）》编委会集结了数十位来自内地和香港顶尖高校及科研院所的知名专家学者。

他们都是目前该领域十分活跃的专家，确保了整套丛书的权威性和前瞻性。

《中外物理学精品书系·引进系列·等离子体天体物理学（第1部分）：原理与实践（影印版）》内容丰富，涵盖面广，可读性强，其中既有对我国传统物理学发展的梳理和总结，也有对正在蓬勃发展的物理学前沿的全面展示；既引进和介绍了世界物理学研究的发展动态，也面向国际主流领域传播中国物理的优秀专著。

可以说，《中外物理学精品书系》力图完整呈现近现代世界和中国物理科学发展的全貌，是一部目前国内为数不多的兼具学术价值和阅读乐趣的经典物理丛书。

《中外物理学精品书系》另一个突出特点是，在把西方物理的精华要义“请进来”的同时，也将我国近现代物理的优秀成果“送出去”。

物理学科在世界范围内的重要性不言而喻，引进和翻译世界物理的经典著作和前沿动态，可以满足当前国内物理教学和科研工作的迫切需求。

另一方面，改革开放几十年来，我国的物理学研究取得了长足发展，一大批具有较高学术价值的著作相继问世。

这套丛书首次将一些中国物理学家的优秀论著以英文版的形式直接推向国际相关研究的主流领域，使世界对中国物理学的过去和现状有更多的深入了解，不仅充分展示出中国物理学研究和积累的“硬实力”，也向世界主动传播我国科技文化领域不断创新的“软实力”，对全面提升中国科学、教育和文化领域的国际形象起到重要的促进作用。

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## 书籍目录

About This Book Plasma Astrophysics: History and Neighbours Particles and Fields: Exact Self-Consistent Description 1.1 Interacting particles and Liouville's theorem 1.1.1 Continuity in phase space 1.1.2 The character of particle interactions 1.1.3 The Lorentz force, gravity 1.1.4 Collisional friction in plasma 1.1.5 The exact distribution function 1.2 Charged particles in the electromagnetic field 1.2.1 General formulation of the problem 1.2.2 The continuity equation for electric charge 1.2.3 Initial equations and initial conditions 1.2.4 Astrophysical plasma applications 1.3 Gravitational systems 1.4 Practice: Exercises and Answers 2 Statistical Description of Interacting Particle Systems 2.1 The averaging of Liouville's equation 2.1.1 Averaging over phase space 2.1.2 Two statistical postulates 2.1.3 A statistical mechanism of mixing in phase space 2.1.4 The derivation of a general kinetic equation 2.2 A collisional integral and correlation functions 2.2.1 Binary interactions 2.2.2 Binary correlation 2.2.3 The collisional integral and binary correlation 2.3 Equations for correlation functions 2.4 Practice: Exercises and Answers Weakly-Coupled Systems with Binary Collisions 3.1 Approximations for binary collisions 3.1.1 The small parameter of kinetic theory 3.1.2 The Vlasov kinetic equation 3.1.3 The Landau collisional integral 3.1.4 The Fokker-Planck equation 3.2 Correlation function and Debye shielding 3.2.1 The Maxwellian distribution function 3.2.2 The averaged force and electric neutrality 3.2.3 Pair correlations and the Debye radius 3.3 Gravitational systems 3.4 Comments on numerical simulations 3.5 Practice: Exercises and Answers Propagation of Fast Particles in Plasma 4.1 Derivation of the basic kinetic equation 4.1.1 Basic approximations 4.1.2 Dimensionless kinetic equation in energy space 4.2 A kinetic equation at high speeds 4.3 The classical thick-target model 4.4 The role of angular diffusion 4.4.1 An approximate account of scattering 4.4.2 The thick-target model 4.5 The reverse-current electric-field effect 4.5.1 The necessity for a beam-neutralizing current 4.5.2 Formulation of a realistic kinetic problem 4.5.3 Dimensionless parameters of the problem 4.5.4 Coulomb losses of energy 4.5.5 New physical results 4.5.6 To the future models 4.6 Practice: Exercises and Answers Motion of a Charged Particle in Given Fields 5.1 A particle in constant homogeneous fields 5.1.1 Relativistic equation of motion 5.1.2 Constant non-magnetic forces 5.1.3 Constant homogeneous magnetic fields 5.1.4 Non-magnetic force in a magnetic field 5.1.5 Electric and gravitational drifts 5.2 Weakly inhomogeneous slowly changing fields 5.2.1 Small parameters in the motion equation 5.2.2 Expansion in powers of  $m/e$  5.2.3 The averaging over gyromotion 5.2.4 Spiral motion of the guiding center 5.2.5 Gradient and inertial drifts 5.3 Practice: Exercises and Answers Adiabatic Invariants in Astrophysical Plasma 6.1 General definitions 6.2 Two main invariants 6.2.1 Motion in the Larmor plane 6.2.2 Magnetic mirrors and traps 6.2.3 Bounce motion 6.2.4 The Fermi acceleration 6.3 The flux invariant 6.4 Approximation accuracy. Exact solutions 6.5 Practice: Exercises and Answers Wave-Particle Interaction in Astrophysical Plasma 7.1 The basis of kinetic theory 7.1.1 The linearized Vlasov equation 7.1.2 The Landau resonance and Landau damping 7.1.3 Gyroresonance 7.2 Stochastic acceleration of particles by waves 7.2.1 The principles of particle acceleration by waves 7.2.2 The Kolmogorov theory of turbulence 7.2.3 MHD turbulent cascading 7.3 The relativistic electron-positron plasma 7.4 Practice: Exercises and Answers Coulomb Collisions in Astrophysical Plasma 8.1 Close and distant collisions 8.1.1 The collision parameters 8.1.2 The Rutherford formula 8.1.3 The test particle concept 8.1.4 Particles in a magnetic trap 8.1.5 The role of distant collisions 8.2 Debye shielding and plasma oscillations 8.2.1 Simple illustrations of the shielding effect 8.2.2 Charge neutrality and oscillations in plasma 8.3 Collisional relaxations in cosmic plasma 8.3.1 Some exact solutions 8.3.2 Two-temperature plasma in solar flares 8.3.3 An adiabatic model for two-temperature plasma 8.3.4 Two-temperature accretion flows 8.4 Dynamic friction in astrophysical plasma 8.4.1 The collisional drag force and energy losses 8.4.2 Electric runaway 8.4.3 Thermal runaway in astrophysical plasma 8.5 Practice: Exercises and Answers 9 Macroscopic Description of Astrophysical Plasma 9.1 Summary of microscopic description 9.2 Transition to macroscopic description 9.3 Macroscopic transfer equations 9.3.1 Equation for the zeroth moment 9.3.2 The momentum conservation law 9.3.3 The energy conservation law 9.4 General properties of transfer equations 9.4.1 Divergent and hydrodynamic forms 9.4.2 Status of conservation laws 9.5 Equation of state and transfer coefficients 9.6 Gravitational systems 9.7 Practice: Exercises and Answers 10 Multi-Fluid Models of Astrophysical Plasma 10.1 Multi-fluid models in astrophysics 10.2

<<等离子体天体物理学,第一部分>>

Langmuir waves 10.2.1 Langmuir waves in a cold plasma 10.2.2 Langmuir waves in a warm plasma 10.2.3 Ion effects in Langmuir waves 10.3 Electromagnetic waves in plasma 10.4 What do we miss? 10.5 Practice: Exercises and Answers 11 The Generalized Ohm's Law in Plasma 11.1 The classic Ohm's law 11.2 Derivation of basic equations 11.3 The general solution 11.4 The conductivity of magnetized plasma 11.4.1 Two limiting cases 11.4.2 The physical interpretation 11.5 Currents and charges in plasma 11.5.1 Collisional and collisionless plasmas 11.5.2 Volume charge and quasi-neutrality 11.6 Practice: Exercises and Answers 12 Single-Fluid Models for Astrophysical Plasma 12.1 Derivation of the single-fluid equations 12.1.1 The continuity equation 12.1.2 The momentum conservation law in plasma 12.1.3 The energy conservation law 12.2 Basic assumptions and the MHD equations 12.2.1 Old and new simplifying assumptions 12.2.2 Non-relativistic magnetohydrodynamics 12.2.3 Relativistic magnetohydrodynamics ..... 13 Magnetohydrodynamics in Astrophysics 14 Plasma Flows in a Strong Magnetic Field 15 MHD Waves in Astrophysical Plasma 16 Discontinuous Flows in a MHD Medium 17 Evolutionarity of MHD Discontinuities 18 Particle Acceleration by Shock Waves 19 Plasma Equilibrium in Magnetic Field 20 Stationary Flows in a Magnetic Field Appendix 1. Notation Appendix 2. Useful Expressions Appendix 3. Constants Bibliography Index

## 章节摘录

版权页：插图： These conditions seem to be approximately satisfied in cluster environments; for more detail see Fox and Loeb (1997). The general case of a strong shock in a fully ionized plasma with heat conduction is complicated by the fact that the electron thermal speed exceeds the shock speed, allowing the electrons to preheat the plasma ahead of the shock (Zel'dovich and Raizer, 1966). Usually heat conduction determines internal scales of the problem being in competition with the thermal instability driven by radiative cooling (Field, 1965; see also Somov and Syrovatskii, 1976a). Radiation emitted by the high-temperature plasma behind the shock also may heat a preshock region. Fast particles, escaping from the high-temperature plasma (see Section 8.4.3), may contribute to the preshock heating too. So we have to be very careful when we apply the adiabatic model of two-temperature plasma to astrophysical conditions. If we come back to HXR tails observed in the X-ray spectra of some clusters, one suggestion is that all or part of this emission might be nonthermal bremsstrahlung from suprathermal electrons with energies of  $\sim 10$ - $100$  keV. These nonthermal electrons would form a population in excess of the normal thermal gas, which is the bulk of the intracluster medium. The most natural explanation of this suprathermal population would be that they are particles currently being accelerated to high energies by turbulence in the intracluster medium. Sarazin and Kempner (2000) have calculated models for the nonthermal HXR bremsstrahlung in the clusters of galaxies. The high-Mach number shocks in young supernova remnants (SNRs) do not produce electron-ion temperature equilibration either. The heating process in these collisionless shocks is not well understood, but the Coulomb collision times are too long to provide the required heating.

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《等离子体天体物理学(第1部分):原理与实践(影印版)》主要是给等离子体天体物理领域的研究者提供参考之用,也会同时会成为本专业以及空间物理、地球物理等专业的研究生感兴趣的读物。

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