

<<等离子体天体物理学,第二部>>

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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(14)·等离子体天体物理学(第2部分):重联与耀斑(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(14)·等离子体天体物理学(第2部分):重联与耀斑(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

Introduction 1 Magnetic Reconnection 1.1 What is magnetic reconnection? 1.1.1 Neutral points of a magnetic field 1.1.2 Reconnection in vacuum 1.1.3 Reconnection in plasma 1.1.4 Three stages in the reconnection process 1.2 Acceleration in current layers, why and how? 1.2.1 The origin of particle acceleration 1.2.2 Acceleration in a neutral current layer 1.3 Practice: Exercises and Answers 2 Reconnection in a Strong Magnetic Field 2.1 Small perturbations near a neutral line 2.1.1 Historical comments 2.1.2 Reconnection in a strong magnetic field 2.1.3 A linearized problem in ideal MHD 2.1.4 Converging waves and the cumulative effect 2.2 Large perturbations near the neutral line 2.2.1 Magnetic field line deformations 2.2.2 Plasma density variations 2.3 Dynamic dissipation of magnetic field 2.3.1 Conditions of appearance 2.3.2 The physical meaning of dynamic dissipation 2.4 Nonstationary analytical models of RCL 2.4.1 Self-similar 2D MHD solutions 2.4.2 Magnetic collapse at the zeroth point 2.4.3 From collisional to collisionless reconnection 3 Evidence of Reconnection in Solar Flares 3.1 The role of magnetic fields 3.1.1 Basic questions 3.1.2 Concept of magnetic reconnection 3.1.3 Some results of observations 3.2 Three-dimensional reconnection in flares 3.2.1 Topological model of an active region 3.2.2 Topological portrait of an active region 3.2.3 Features of the flare topological model 3.2.4 The S-like morphology and eruptive activity 3.3 A current layer as the source of energy 3.3.1 Pre-flare accumulation of energy 3.3.2 Flare energy release 3.3.3 The RCL as a part of an electric circuit 3.4 Reconnection in action 3.4.1 Solar flares of the Syrovatsky type 3.4.2 Sakao-type flares 3.4.3 New topological models 3.4.4 Reconnection between active regions 4 The Bastille Day 2000 Flare 4.1 Main observational properties 4.1.1 General characteristics of the flare 4.1.2 Overlay HXR images on magnetograms 4.1.3 Questions of interpretation 4.1.4 Motion of the HXR kernels 4.1.5 Magnetic field evolution 4.1.6 The HXR kernels and field evolution 4.2 Simplified topological model 4.2.1 Photospheric field model. Topological portrait 4.2.2 Coronal field model. Separators 4.2.3 Chromospheric ribbons and kernels 4.2.4 Reconnected magnetic flux. Electric field 4.2.5 Discussion of topological model 5 Electric Currents Related to Reconnection 5.1 Magnetic reconnection in the corona 5.1.1 Plane reconnection model as a starting point 5.1.2 Three-component reconnection 5.2 Photospheric shear and coronal reconnection 5.2.1 Accumulation of magnetic energy 5.2.2 Flare energy release and CMEs 5.2.3 Flare and HXR footpoints 5.3 Shear flows and photospheric reconnection 5.4 Motions of the HXR footpoints in flares 5.4.1 The footpoint motions in some flares 5.4.2 Statistics of the footpoint motions 5.4.3 The FP motions orthogonal to the SNL 5.4.4 The FP motions along the SNL 5.4.5 Discussion of statistical results 5.5 Open issues and some conclusions 6 Models of Reconnecting Current Layers 6.1 Magnetically neutral current layers 6.1.1 The simplest MHD model 6.1.2 The current layer by Syrovatskii 6.1.3 Simple scaling laws 6.2 Magnetically non-neutral RCL 6.2.1 Transversal magnetic fields 6.2.2 The longitudinal magnetic field 6.3 Basic physics of the SHTCL 6.3.1 A general formulation of the problem 6.3.2 Problem in the strong field approximation 6.3.3 Basic local parameters of the SHTCL 6.3.4 The general solution of the problem 6.3.5 Plasma turbulence inside the SHTCL 6.3.6 Formulae for the basic parameters of the SHTCL 6.4 Open issues of reconnection in flares 6.5 Practice: Exercises and Answers Reconnection and Collapsing Traps in Solar Flares 7.1 SHTCL in solar flares 7.1.1 Why are flares so different but similar? 7.1.2 Super-hot plasma production 7.1.3 On the particle acceleration in a SHTCL 7.2 Coronal HXR sources in flares 7.2.1 General properties and observational problems 7.2.2 Upward motion of coronal HXR sources 7.2.3 Data on average upward velocity 7.3 The collapsing trap effect in solar flares 7.3.1 Fast electrons in coronal HXR sources 7.3.2 Fast plasma outflows and shocks 7.3.3 Particle acceleration in collapsing trap 7.3.4 The upward motion of coronal HXR sources 7.3.5 Trap without a shock wave 7.4 Acceleration mechanisms in traps 7.4.1 Fast and slow reconnection 7.4.2 The first-order Fermi-type acceleration 7.4.3 The betatron acceleration in a collapsing trap 7.4.4 The betatron acceleration in a shockless trap 7.5 Final remarks 7.6 Practice: Exercises and Answers 8 Solar-type Flares in Laboratory and Space 8.1 Solar flares in laboratory 8.1.1 Turbulent heating in toroidal devices 8.1.2 Current-driven turbulence in current layers 8.1.3 Parameters of a current layer with CDT 8.1.4 The SHTCL with anomalous heat conduction 8.2 Magnetospheric Physics Problems 8.2.1 Reconnection in the Earth Magnetosphere 8.2.2 MHD simulations of space weather 8.3 Flares in accretion disk coronae 8.3.1 Introductory comments 8.3.2 Models of the

star magnetosphere 8.3.3 Power of energy release in the disk coroneae 8.4 The giant flares Particle Acceleration in Current Layers 9.1 Magnetically non-neutral RCLs 9.1.1 An introduction in the problem 9.1.2 Dimensionless parameters and equations 9.1.3 An iterative solution of the problem 9.1.4 The maximum energy of an accelerated particle 9.1.5 The non-adiabatic thickness of current layer 9.2 Regular versus chaotic acceleration 9.2.1 Reasons for chaos 9.2.2 The stabilizing effect of the longitudinal field 9.2.3 Characteristic times of processes 9.2.4 Dynamics of accelerated electrons in solar flares 9.2.5 Particle simulations of collisionless reconnection 9.3 Ion acceleration in current layers 9.3.1 Ions are much heavier than electrons 9.3.2 Electrically non-neutral current layers 9.3.3 Maximum particle energy and acceleration rates 9.4 How are solar particles accelerated? 10 Structural Instability of Reconnecting Current Layers 11 Tearing Instability of Reconnecting Current Layers 12 Magnetic Reconnection and Turbulence 13 Reconnection in Weakly-Ionized Plasma 14 Magnetic Reconnection of Electric Currents Epilogue Appendix 1. Acronyms Appendix 2. Notation Appendix 3. Useful Formulae Appendix 4. Constants Bibliography Index

章节摘录

版权页：插图： According to Moiseev and Chkhetiani (1996), the mechanism that generates the mean hydrodynamic helicity leads to a second cascade range in addition to the Kolmogorov range (vol. 1, Section 7.2.2). The constant that does not depend on the scale of the helicity here is its flux. Nevertheless this requirement, like the requirement that the energy flux F be constant in the Kolmogorov range, is not inflexible. The spectral characteristics undergo significant changes. They are associated, as we understand, with at least a partial inverse cascade into the large-scale region. There is a broad class of effects that generate both hydrodynamic helicity itself and large helicity fluctuations under terrestrial and astrophysical conditions. In particular, the simultaneous presence of such factors as temperature and density gradients, shearing flows, and nonuniform rotation is insufficient. Like the direct cascade in the Kolmogorov turbulence, the inverse cascade is accomplished by nonlinear interactions, suggesting that nonlinearity is important. However a spectral type of inverse cascade is the strongly nonlocal inverse cascade process, which is usually referred to as the α -effect (Moffatt, 1978; Krause and Rädler, 1980). This effect exists already in linear kinematic problems. A strong indication, that the α -effect is responsible for large-scale magnetic field generation, comes from detailed analysis of three-dimensional simulations of forced MHD turbulence (Brandenburg, 2001). This may seem rather surprising at the first glance, if one pictures large-scale field generation as the result of an inverse cascade process, that (Brandenburg and Subramanian, 2000) the exact type of nonlinearity in the MHD equations is unessential as far as the nature of large-scale field generation is concerned. However, magnetic helicity can only change on a resistive timescale. So the time it takes to organize the field into large scales increases with magnetic Reynolds number.

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《等离子体天体物理学(第2部分):重联与耀斑(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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