

## CONTENTS

### PARTICLE DYNAMICS IN MAGNETIC TRAPS

B. V. Chirikov

1.	Introduction. Budker's Problem . . . . .	1
2.	Choice of Unperturbed System . . . . .	4
3.	A Few Examples . . . . .	5
4.	Adiabatic Perturbation . . . . .	15
5.	Insignificant Effect of Perturbation . . . . .	18
6.	Nonlinear Resonances . . . . .	19
7.	Resonant $\Delta\mu$ . . . . .	22
8.	Mapping . . . . .	35
9.	Standard Mapping . . . . .	39
10.	Limit of Global Stability . . . . .	41
11.	Local Diffusion . . . . .	50
12.	Dynamic Correlations . . . . .	58
13.	Global Diffusion . . . . .	65
14.	Cohen's Mapping . . . . .	73
15.	Remarks on Adiabatic Invariance . . . . .	84
	References . . . . .	88

### TRANSPORT PROCESSES IN AXISYMMETRIC OPEN TRAPS

D. D. Ryutov and G. V. Stupakov

1.	Introduction . . . . .	93
2.	Plasma Equilibrium . . . . .	100
3.	Drift Motion of Charged Particles in Open Traps . . . . .	118
4.	Neoclassical Transport in Open Traps . . . . .	145
5.	Resonant Stochastic Transport in Open Traps . . . . .	172
	Appendix 1 . . . . .	192
	Appendix 2 . . . . .	194
	Appendix 3 . . . . .	195
	Appendix 4 . . . . .	197
	Appendix 5 . . . . .	198
	References . . . . .	200

CLASSICAL LONGITUDINAL PLASMA LOSSES FROM OPEN ADIABATIC TRAPS	
V. P. Pastukhov	
Introduction . . . . .	203
1. Basic Principles of Plasma Confinement in Simple Mirror Traps . . . . .	205
2. Electron Confinement in Simple Mirror Traps . . . . .	214
3. Ion Confinement in Simple Mirror Traps . . . . .	228
4. Traps with Improved Longitudinal Plasma Confinement . . . . .	245
References . . . . .	257
SPECTRAL-LINE BROADENING IN A PLASMA	
V. I. Kogan, V. S. Lisitsa, and G. V. Sholin	
Introduction . . . . .	261
1. General Equations for the Intensity Distribution in a Line . . . . .	263
2. Plasma Microfield . . . . .	267
3. Line-Broadening Mechanisms in a Plasma. Character of Atom Interaction with a Plasma Microfield . . . . .	280
4. Static Theory and Its Generalizations . . . . .	298
5. Impact Theory of Broadening by Particles and Waves . . . . .	313
6. Transition from the Impact to the Static Broadening Mechanism . . . . .	321
7. Comparison of Theory with Experiment. Conclusions . . . . .	325
References . . . . .	331
ELECTRON CYCLOTRON PLASMA HEATING IN TOKAMAKS	
A. D. Piliya and V. I. Fedorov	
Introduction . . . . .	335
1. Electromagnetic Waves in the Region of Electron-Cyclotron Resonance Frequencies . . . . .	336
2. Electron-Cyclotron Resonance in a Homogeneous Plasma with Allowance for the Thermal Motion of the Electrons . . . . .	340
3. Poynting Vector and Energy Absorption in Cyclotron Resonance . . . . .	347

4. Accessibility of Resonances in a Tokamak . . . . .	354
5. Cyclotron Damping of Waves in the Model of One-Dimensional Inhomogeneity . . . . .	359
6. Reflection of Waves from a Resonance Region . . . . .	364
7. Linear Transformation of Waves Near the Upper Hybrid Resonance . . . . .	366
8. Eikonal Equation in the Vicinity of the Cyclotron Resonance and Ray Trajectories of Waves . . . . .	368
9. Applicability of Geometric Optics in the Vicinity of Cyclotron Resonance . . . . .	373
10. Ray Trajectories and Wave Absorption in Tokamaks . . . . .	377
11. Role of Nonlinear Effects in Electron-Cyclotron Heating . . . . .	381
References . . . . .	385