CONTENTS

SOLITONS AND TURBULENCE

V. I. Petviashvili and V. V. Yan'kov

Introd	uction					
1.	Simplest Solitons and Integrals of Motion					
2.	The Soliton as a Statistical Attractor					
3.	Examples of Deriving Simplified Equations. Multi-					
	dimensional Generalization of KdV Equation,					
	Equation of MHD Wave Propagating along a Magnetic Field 1					
4.	Numerical Method of Obtaining Soliton Solutions					
6.	Interaction of a Soliton with Free Waves					
	Interaction of a Soliton with Particles2					
8.	Emission of Electromagnetic Waves by Solitons					
9.	High-Frequency Soliton Acted Upon by Slowly Varying					
	Perturbations					
	Bound Many-Soliton States – Multisolitons					
11.	Methods of Observing Crypto-Linear Equations					
	Two-Dimensional Vortices in an Incompressible Liquid 3					
	Problems of Finite-Dimensional Approximations 4					
	Drift Vortices in the Atmosphere and in a Plasma 4					
	Three-Dimensional Localized Vortices in Ordinary					
	Hydrodynamics and in Magnetohydrodynamics 4					
	Stable Vortices and Vlasov's Equation					
Conclusion						
Refer	ences 5					

v

vi Contents

CYCLOTRON OSCILLATIONS OF AN EQUILIBRIUM PLASMA

A. V. Timofeev

Intro	ductio	on	63		
1. Cyclotron Oscillations in a Uniform Magnetic Field					
	1.1.	Mechanism of Resonant Cyclotron Interaction	65		
		Cyclotron Absorption	83		
	1.3.	Magnetic Bremsstrahlung (Cyclotron) Emission	106		
	1.4.	Natural Cyclotron Oscillations	122		
2.	Cycl	otron Oscillations in a Nonuniform Magnetic Field	127		
		Resonant Cyclotron Interaction in a Nonuniform			
		Magnetic Field	127		
	2.2.	Cyclotron Oscillations in a Monotonically Varying			
		Magnetic Field	147		
	2.3.	Cyclotron Oscillations in a Nonmonotonically			
		Varying Magnetic Field	181		
3.	Cycl	otron Oscillations in Bounded Systems	192		
		Cyclotron Heating in Regular Oscillations.			
		Onset of Stochasticity	192		
	3.2.	Cyclotron Heating in the Presence of Random Actions	210		
	3.3.	Effects Due to Resonant Cyclotron Interaction in			
		Bounded Systems	221		
Appe	endice	S			
		Solution of Equation (2.13)			
		Modification of Bypass Rule	235		
	A.3.	Landau Bypass Rule for Accelerated Electron Motion	238		
	A.4.	Reciprocity Theorem	239		
	A.5.	Equation of Quasilinear Diffusion of Electrons in			
		Adiabatic Traps	241		
	A.6.	Calculation of the Shift of the Electron-Reflection			
		Point from a Magnetic Mirror			
Refe	rences	S	243		