

TABLE OF CONTENTS

Preface	V
1) Aim and Scope	1
2) Review of Phenomena	7
3) Elements of Microscopic Plasma Theorie	19
Plasma Frequency and Debye Length	21
Plasmons	26
Cyclotron Frequency	29
Collisions	31
4) Hydrodynamics	37
Euler's Equation of Motion	37
Bernoulli's stationary Solution	38
Equation of Continuity	39
Compressibility	40
Acoustic Waves	41
Equation of Energy	43
5) Self-Similarity Model	45
Hydrodynamic Deviation	46
Laser Irradiation with Varying Radius	49
Numerical Example	53
Application to Foils	55
6) Plasma Dynamics and Lorentz Theory	58
The Schlueter Equation of Motion	58
Electrodynamic Equations	59
Refractive Index of Plasma and its Relation to Absorption	64
Nonlinear and Relativistic Absorption	71
7) Waves in Inhomogeneous Plasma	76
WKB Solution for Perpendicular Incidence	77
Oblique Incidence and WKB Solution	79
The Rayleigh Profile	84
The Airy Profiles	94
8) Equation of Motion	96
Collisional Term of the Nonlinear Force	97
Equivalence to Maxwellian Stress Tensor	104
Obliquely Incident Plane Waves	108
Summary	111
9) Momentum Transfer and the Abraham-Minkowski Problem	113
Range of Predominance of the Nonlinear Force	114
Momentum Transfer to the Plasma Corona and Compression	117

VIII

Energy Transfer by Integration of the	
Nonlinear Force	120
Photon Momentum in Plasma (Abraham-Minkowski)	122
Summary	128
10) Numerical and Experimental Examples - Solitons	129
Thermokinetic Forces	129
Static Cases with Nonlinear Forces	134
Approximative Dynamic Cases - Cavitons	137
Experimental Examples	147
Acceleration of Thick Blocks and Solitons	150
Parametric Instabilities	163
11) Striated Motion and Resonance Absorption	165
Striated Motion	165
Resonance Absorption	179
12) Self-Focussing of Laser Beams in Plasma	189
Nonlinear-Force- (Ponderomotive) Self-Focussing	190
Relativistic Self-Focussing	193
Laser Beams in Tenuous Plasmas and Spontaneous	
Magnetic Fields	201
Conclusions for Medium Laser Intensities	204
Conclusions for Very High Laser Intensities	206
13) Laser Compression of Plasma for Nuclear Fusion	211
Results on Laser Fusion	211
Requirement for Laser Fusion	214
Laser Pellet Compression Schemes	215
Fusion Gain Calculations	219
Conclusions	222
Index (References, Names, Subjects)	223