CONTENTS

Chapter 1. Basic Equations

1. The equations of electrodynamics 1
2. The equations of fluid dynamics and the computation of the electromagnetic forces 9
3. Ohm's law 18
4. The equations of magnetohydrodynamics 31
5. The simplest integrals of magnetohydrodynamic equations 37

Chapter 2. Motion of an Incompressible Liquid

1. The motion of a viscous electrically conducting fluid with linear current flow 42
2. Steady-state motion along a magnetic field 54
3. Wave motion of an ideal fluid 58

Chapter 3. Simple Wave Structures and Small Disturbances in an Ideal Gas

1. Weak discontinuities 64
2. Simple waves 70
3. Small disturbances 79

Chapter 4. Surfaces of Discontinuity in an Ideal Gas

1. Classification of surfaces of strong discontinuity 84
2. Evolution of magnetohydrodynamic shock waves 88
3. Solution of the shock wave conditions in a perfect gas 95

Chapter 5. Nonstationary Motions of an Ideal Gas

1. Problem of the flat piston 108
2. Disintegration of an arbitrary discontinuity 113
3. Propagation of weak shock waves and weak discontinuities in space . . 121
4. One-dimensional symmetric motion: homogeneous deformations about an axis of symmetry 126

Chapter 6. Stationary Motion of an Ideal Gas

1. Characteristics of the magnetohydrodynamic equations for stationary flow 131
2. Linear problems 134
3. Stationary simple waves 146

Chapter 7. Stationary Motion of a Nonideal Gas

1. Flow in current tubes 154
2. Structure of magnetohydrodynamic shock waves 161

Chapter 8. The Flow of a Conducting Fluid Past Magnetized Bodies

1. The flow of an ideal fluid past magnetized bodies 180
2. Fluid of finite electrical conductivity flowing past a magnetized body . 184

APPENDIX I. **The Structure of Shock Waves** 194

APPENDIX II. **The Structure of a Magnetohydrodynamic Shock Wave in a Gas with Anisotropic Conductivity** 206

REFERENCES 208

INDEX 215