

Contents

LIST OF CONTRIBUTORS

vii

Aspects of Invariance in Solid Mechanics

Rodney Hill

Introduction	1
I. Preliminary Concepts	3
II. Constitutive Descriptions	28
III. Bifurcation Theory	50
References	72

The Optimum Theory of Turbulence

F. H. Busse

I. Introduction	77
II. The Optimum Problem for Turbulent Couette Flow	80
III. Multi- α Solutions	84
IV. Bounds on the Transport of Momentum	94
V. Bounds on the Transport of Mass	105
VI. Bounds on the Transport of Heat	110
VII. General Discussion	115
References	119

Computational Modeling of Turbulent Flows

John L. Lumley

I. Introduction	124
II. Mathematical Preliminaries	128
III. The Return to Isotropy	133
IV. The Rapid Terms	143
V. The Dissipation Equations	152
VI. Transport Terms	160
References	174

Unsteady Separation According to the Boundary-Layer Equation

Shan-Fu Shen

I. Introduction	177
II. Asymptotic Behavior of the Boundary-Layer Solution Away from the Wall	182
III. Separation and the Concept of an Unmatchable Boundary Layer	186
IV. The Semisimilar Boundary Layer	192
V. The General Unsteady Boundary Layer	203
VI. Separation in Lagrangian Description	213
References	218

The Theory of Ship Motions

J. N. Newman

I. Introduction	222
II. History	227
III. The Boundary-Value Problem	235
IV. Fundamental Solutions	244
V. Two-Dimensional Bodies	249
VI. Slender-Body Radiation	258
VII. Slender-Body Diffraction	266
VIII. The Pressure Force	273
References	280

Numerical Methods in Fluid Dynamics

C. K. Chu

I. Introduction	286
II. Differential Equations and Boundary Conditions	287
III. Numerical Analysis Background	292
IV. Pseudophysical Effects: Numerical Dissipation and Dispersion	301
V. Gas Dynamics	309
VI. Navier-Stokes Equations	317
VII. Magnetohydrodynamics	327
References	329

AUTHOR INDEX 333

SUBJECT INDEX 339