

Contents

LIST OF CONTRIBUTORS	vii
PREFACE	ix

Hydromechanics of Swimming of Fishes and Cetaceans

Th. Yao-Tsu Wu

I. Introduction	1
II. Inviscid Flow Theory	4
III. Skin-Frictional Resistance of Fish and Cetacean	35
IV. Optimum Shape Problems in Swimming Propulsion	38
V. Concluding Remarks	59
References	61

Biomechanics: A Survey of the Blood Flow Problem

Y. C. Fung

I. Introduction	65
II. Historical Remarks	66
III. Basic Information Required for Formulating Blood Flow Problems	69
IV. Boundary-Value Problems	94
V. Microcirculation	107
VI. Conclusion	118
References	119

Two-Dimensional Shock Structure in Transonic and Hypersonic Flow

Martin Sichel

I. Introduction	132
II. Flows with Two-Dimensional Shock Waves	133

III. The Viscous-Transonic Equation	146
IV. The Nozzle Problem	157
V. External Flows	169
VI. Curved Shock Waves in Hypersonic Flow	191
VII. Discussion	203
References	205
Nonlinear Theory of Random Vibrations	
<i>T. K. Caughey</i>	
I. Introduction	209
II. Modeling in Nonlinear Random Vibrations by Markov Processes	211
III. Basic Theory of Stochastic Processes	213
IV. Applications and Solution Techniques	227
References	250
Physical Theory of Plasticity	
<i>T. H. Lin</i>	
I. Introduction	256
II. Dislocation and Plastic Deformation of Single Crystals	256
III. Homogeneous Strain Analysis of Polycrystals	265
IV. Simplified Slip Theories for Non-radial Loadings	271
V. Analysis Satisfying Both Equilibrium and Compatibility Conditions	272
VI. Self-Consistent Theories of Polycrystal Plastic Deformation	280
VII. Calculation of Heterogeneous Stress and Slip Fields	288
References	307
Thermodynamic Theory of Viscoplasticity	
<i>Piotr Perzyna</i>	
I. Introduction	313
II. Thermodynamics of a Material with Internal State Variables	319
III. General Description of an Elastic-Viscoplastic Material	322
IV. Elastic-Plastic Material	326
V. Discussion of Particular Cases	329
VI. Equilibrium State and the Relaxation Process	331
VII. Isotropic Material	333
VIII. Physical Foundations of Viscoplasticity	334
IX. Comparisons with Experimental Results	337
References	347
AUTHOR INDEX	355
SUBJECT INDEX	364