# **Contents**

Contributors	vii
Preface	ix

ix

## Micromechanics of Crack Initiation in High-Cycle Fatigue

T. H. Lin

Ι.	Introduction	2
H.	Dislocations and Plastic Strain	2
III.	Slip Bands under Monotonic Loadings	7
IV.	A Micromechanic Theory of Fatigue Crack Initiation	19
V.	A Quantitative Theory of Fatigue Crack Initiation	30
VI.	Effects of Mean Stress, Grain Size, Strain Hardening, and Overload	45
VII.	Combined Cyclic Axial and Torsional Loadings	51
	Acknowledgments	59
	References	59

#### Mixed Mode Cracking in Layered Materials

#### J. W. Hutchinson and Z. Suo

I.	Introduction	64
II.	Mixed Mode Fracture: Crack Tip Fields and Propagation Criteria	65
III.	Elasticity Solutions for Cracks in Multilayers	90
IV.	Laminate Fracture Test	112
v.	Cracking of Pre-tensioned Films	126
VI.	Buckle-Driven Delamination of Thin Films	147
VII.	Blister Tests	167
VIII.	Failure Modes of Brittle Adhesive Joints and Sandwich Layers	172
	Acknowledgments	186
	References	187

## NND Schemes and Their Applications to Numerical Simulation of **Two- and Three-Dimensional Flows**

### Hanxin Zhang and Fenggan Zhuang

I. Introduction	193
II. The Importance of the Role of the Third-Order Dispersion Term	194
III. A Formulation of the Semi-discretized NND Scheme	200

#### **Contents**

IV.	Explicit NND Schemes	206
V.	Implicit NND Scheme	211
VI.	Applications to Solutions of Euler and Navier-Stokes Equations	213
VII.	Concluding Remarks	254
	References	256

Author Index	257
Subject Index	260

vi