

CONTENTS

CONTRIBUTORS TO VOLUME IV.	v
PREFACE.	vii

The Turbulent Boundary Layer

BY FRANCIS H. CLAUSER, *Johns Hopkins University, Baltimore, Maryland*

I. Introduction	2
II. Constant-Pressure Layers	2
III. The General Turbulent Boundary Layer	21
IV. Further Consideration of the Behavior of Turbulent Layers	34
V. Conclusion.	51
References.	51

Nonlinear Elasticity

BY T. C. DOYLE AND J. L. ERICKSEN, *Naval Research Laboratory, Washington, D. C.*

I. Introduction	53
II. Coordinate Systems and Base Vectors.	54
III. Tensor Analysis of Two Point Fields	58
IV. Deformation Measures	63
V. The Formulation of the General Theory	69
VI. Boundary Value Problems.	73
VII. Special Types of Materials	81
VIII. General Solutions.	88
IX. Polynomial Approximations to Σ	97
X. Methods of Approximating	102
XI. Motion of Surfaces in Continua	107
XII. Generalizations of the Theory	108
References.	111

Physical and Statistical Aspects of Fatigue

BY A. M. FREUDENTHAL AND E. J. GUMBEL, *Departments of Civil and Industrial Engineering, Columbia University, New York, N. Y.*

I. The Problem of Fatigue Design	116
II. Principal Aspects of the Fatigue Phenomenon	119
III. Micromechanism of Progressive Fracture	122
IV. Fatigue Theories	127
V. Statistical Theory of Extreme Values	131
VI. Distribution of Fatigue Life and Fatigue Strength	138
VII. Cumulative Damage	151
References.	156

Three-Dimensional Boundary Layer Theory

BY FRANKLIN K. MOORE, *National Advisory Committee for Aeronautics, Lewis Flight Propulsion Laboratory, Cleveland, Ohio*

I. Introduction	160
II. Equations of Laminar Motion	163
III. Bodies and Fluids in Rotation	166
IV. Surfaces of Revolution in Axial Motion	175
V. Yawed Infinite Cylinders and Related Problems	181
VI. Boundary Layer of Conical Surfaces. Separation	196
VII. Secondary Flows Abruptly Formed	206
VIII. Boundary Regions	210
IX. Laminar Stability	215
X. Approximate Methods. Concluding Remarks	219
References.	224

Dislocation Theory of Plasticity of Metals

BY G. SCHÖCK, *Westinghouse Research Laboratories, East Pittsburgh, Pennsylvania*

I. Introduction	229
II. Dislocations in Crystals	231
III. General Features of Dislocations.	235
IV. Experimental Evidence for Dislocations	246
V. Mechanical Properties	253
References.	274

The Poincaré-Lighthill-Kuo Method

BY H. S. TSIAI, *Daniel and Florence Guggenheim Jet Propulsion Center, California Institute of Technology, Pasadena, California*

I. Introduction	281
II. Ordinary Differential Equations	287
III. Hyperbolic Partial Differential Equations	314
IV. Elliptic Partial Differential Equations	333
V. Applications to Fluid Boundary Layer Problems	335
IV. Concluding Remarks	347
References.	348

On the Concept of Elastic Stability

BY HANS ZIEGLER, *Eidgenössische Technische Hochschule, Zürich, Switzerland*

I. Current Methods	352
II. Preliminary Criticism	357
III. Mechanical Systems	366
IV. Stability of Linear Systems	373
V. Buckling by Compression	384
VI. Buckling by Torsion	388
VII. Critical Angular Velocities	394
References.	402
Author Index	405
Subject Index	410