1. Introduction
   Industrial Significance of Fatigue Problems
   Fracture and Structure
   Fatigue Properties in Engineering
   Alloy Design for Fatigue and Fracture
   Micromechanisms of Monotonic and Cyclic Crack Growth

2. Fatigue Mechanisms, Crack Growth, and Testing
   Fatigue Failure in Metals
   Cyclic Stress-Strain Response and Microstructure
   Fatigue Crack Nucleation and Microstructure
   Fatigue Crack Growth under Variable-Amplitude Loading
   Fatigue Crack Thresholds
   Behavior of Small Fatigue Cracks
   Effect of Crack Shape on Fatigue Crack Growth
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   Mechanisms of Corrosion Fatigue
   Corrosion Fatigue Testing
   Detection and Monitoring of Fatigue Cracks

3. Fatigue Strength Prediction and Analysis
   Fundamentals of Modern Fatigue Analysis for Design
   Estimating Fatigue Life
   Multiaxial Fatigue Strength
   Factors Influencing Weldment Fatigue
   Fatigue of Mechanically Fastened Joints
   Statistical Considerations in Fatigue
   Planning and Evaluation of Fatigue Tests
   Effect of Surface Conditions and Processing on Fatigue Performance
   Fretting Fatigue
   Contact Fatigue
   Fatigue and Fracture Control for Powder Metallurgy Components
   Fatigue and Life Prediction of Gears
   Fatigue and Life Prediction of Bearings
   Fatigue of Springs
4. Fracture Mechanics, Damage Tolerance, and Life Assessment
   - An Introduction to Fracture Mechanics
   - Fracture Resistance of Structural Alloys
   - Fracture Toughness Testing
   - Concepts of Fracture Control and Damage Tolerance Analysis
   - The Practice of Damage Tolerance Analysis
   - Residual Strength of Metal Structures
   - Fatigue and Fracture Control of Weldments
   - Fracture Mechanics in Failure Analysis
   - Operating Stress Maps for Failure Control
   - Failure Control in Process Operations
   - Stress-Corrosion Cracking and Hydrogen Embrittlement
   - Elevated-Temperature Crack Growth
   - High-Temperature Life Assessment
   - Thermal and Thermo mechanical Fatigue of Structural Alloys
   - Life Extension and Damage Tolerance of Aircraft
   - Damage Tolerance Certification of Commercial Aircraft
   - The U.S. Air Force Approach to Aircraft Damage Tolerant Design

5. Fatigue and Fracture Resistance of Ferrous Alloys
   - Fracture and Fatigue Properties of Structural Steels
   - Fatigue Resistance and Microstructure of Ferrous Alloys
   - Fracture Mechanics Properties of Carbon and Alloy Steels
   - Fatigue and Fracture Properties of Cast Steels
   - Fatigue and Fracture Properties of Cast Irons
   - Bending Fatigue of Carburized Steels
   - Contact Fatigue of Hardened Steels
   - Fatigue and Fracture Resistance of Heat-Resistant (Cr-Mo) Ferritic Steels
   - Fatigue and Fracture Properties of Stainless Steels
   - Fracture Toughness of Austenitic Stainless Steels and Their Welds
   - Fatigue and Fracture Properties of Duplex Stainless Steels

6. Fatigue and Fracture Resistance of Nonferrous Alloys
   - Selecting Aluminum Alloys to Resist Failure by Fracture Mechanisms
   - Fatigue and Fracture Properties of Aluminum Alloy Castings
   - Fatigue Strength of Aluminum Alloy Welds
Fatigue and Fracture Properties of Titanium Alloys
Fatigue and Fracture of Nickel-Base Superalloys
Fatigue Properties of Copper Alloys
Fatigue and Fracture Resistance of Magnesium Alloys
Fatigue of Solders and Electronic Materials

7. Fatigue and Fracture of Composites, Ceramics, and Glasses
   Fracture and Fatigue of DRA Composites
   Fatigue of Composite Laminates
   Residual Strength of Composite Aircraft Structures with Damage
   Fatigue of Brittle Materials
   Toughening and Strengthening Models for Nominally Brittle Materials
   Fatigue and Fracture Behavior of Glasses

8. Appendices
   Parameters for Estimating Fatigue Life
   Summary of Stress-Intensity Factors