



Introduction to Thermodynamics of Mechanical Fatigue

Michael M. Khonsari, Mehdi Amiri

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Fatigue is probabilistic in nature and involves a complex spectrum of loading history with variable amplitudes and frequencies. Yet most available fatigue failure prediction methods are empirical and concentrate on very specific types of loading. Taking a different approach, **Introduction to Thermodynamics of Mechanical Fatigue** examines the treatment of fatigue via the principles of thermodynamics. It starts from the premise that fatigue is a dissipative process and must obey the laws of thermodynamics. In general, it can be hypothesized that mechanical degradation is a consequence of irreversible thermodynamic processes. This suggests that entropy generation offers a natural measure of degradation.

An Entropic Approach to Fatigue and Degradation

Drawing on recent cutting-edge research and development, the authors present a unified entropic approach to problems involving fatigue. They introduce the fundamentals of fatigue processes and explore a wide range of practical engineering applications.

Fundamental Concepts and Methodologies

The book reviews commonly observed failure modes, discusses how to analyze fatigue problems, and examines the deformation characteristics of a solid material subjected to fatigue loading. It also looks at how to use thermodynamics to determine the onset of fatigue failure. In addition, the book presents methodologies for improving fatigue life and for accelerated fatigue testing.

Learn How to Apply the Entropic Approach to Fatigue Problems

Comprehensive and well organized, this work helps readers apply powerful thermodynamics concepts to effectively treat fatigue problems at the design stage. It offers an accessible introduction to a new and exciting area of research in the field of fatigue failure analysis.



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