
Preface

Functionality, quality, reliability, and safety are indispensable attributes of all technologies. This handbook presents concepts, methods, and techniques to examine symptoms of fault and failure of structures, systems, and components to monitor functional performance and structural integrity.

The book is organized in five parts:

- Part I introduces the scope and application of technical diagnostics and gives a comprehensive overview of the physics of failure.
- Part II presents all relevant methods and techniques for diagnostics and monitoring: from stress, strain, vibration analysis, nondestructive evaluation, thermography and industrial radiology to computed tomography and subsurface microstructural analysis.
- Part III covers the principles and concepts of technical failure analysis, illustrates case studies, and outlines machinery diagnostics with an emphasis on tribological systems.
- Part IV describes the application of structural health monitoring and performance control to plants and technical infrastructures, including buildings, bridges, pipelines, electric power stations, offshore wind structures, and railway systems.
- Part V is an excursion on diagnostics in arts and culture.

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The book integrates knowledge of basic sciences and engineering disciplines with contributions from research institutions, academe, and industry, written by internationally known experts from various parts of the world, including Europe, Canada, India, Japan, and the US. I am very grateful to all colleagues for their excellent contributions, and Springer for publishing this international interdisciplinary work—which may help to make the world safer.

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