



# Vibration Analysis, Instruments, and Signal Processing

*Jyoti Kumar Sinha*

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**Vibration Analysis, Instruments, and Signal Processing** Jyoti Kumar Sinha

*Provides Typical Abstract Representations of Different Steps for Analyzing Any Dynamic System*

Vibration and dynamics are common in everyday life, and the use of vibration measurements, tests, and analyses is becoming standard for various applications. **Vibration Analysis, Instruments, and Signal Processing** focuses on the basic understanding of vibration measurements and analysis. This book covers different areas of vibration measurements and analysis needed in practice, and discusses theory, application, and a variety of methods, in a simplified way. It communicates the fundamental principles of all three facets of vibration-based analysis, and highlights four major points—theory, instruments, experiments, and signal processing.

Useful for everyday work, the book dedicates several chapters to the day-to-day requirements involved in vibration measurements and analysis, and addresses a number of topics useful for many day-to-day analyses and experiments. The book provides experimental examples in each chapter—considering basic theories and analysis methods, instrumentations and signal processing methods, and combined analysis—as well as experimental approaches and case studies. In addition, it dedicates a complete chapter to case studies relating the basic theory, types of instruments and measurements needed, and requisite signal processing that ultimately result in a final diagnosis.

Consisting of ten chapters, this informative text:

- Provides the basic understanding and concept of the vibration theory, mathematical modeling of structures and machines using the finite element (FE) method, and the vibration response computation using the FE model for the load applied
- Discusses a simplified vibration theory through a single degree of freedom (SDOF) system of a mass and a spring

- Introduces the concept of FE modeling at a very basic level through a few simple examples
- Explores how the equation of motion in matrix form for any system can be integrated to solve for the responses at all DOFs due to the time-varying external loadings

Developed for diverse audiences interested in vibration analysis, this book is suitable for every level of student, engineer, and scientist associated with vibration, structural and rotor dynamics, vibration-based diagnosis, and vibration-based condition monitoring.

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