

- 1 Introduction
 - Introduction to Free Vibration
 - Harmonic Motion
 - Viscous Damping
 - Modeling and Energy Methods
 - Stiffness
 - Measurement
 - Design Considerations
 - Stability
 - Numerical Simulation of the Time Response
 - Coulomb Friction and the Pendulum
- 2 Response to Harmonic Excitation
 - Harmonic Excitation of Undamped Systems
 - Harmonic Excitation of Damped Systems
 - Alternative Representations
 - Base Excitation
 - Rotating Unbalance
 - Measurement
 - Other Forms of Damping
 - Numerical Simulation and Design
 - Nonlinear Response Properties
- 3 General Forced Response
 - Impulse Response Function
 - Response to an Arbitrary Input
 - Response to an Arbitrary Periodic Input
 - Transform Methods
 - Response to Random Inputs
 - Shock Spectrum
 - Measurement via Transfer Functions
 - Stability
 - Numerical Simulation of the Response
 - Nonlinear Response Properties
- 4 Multiple-Degree-of-Freedom Systems
 - Two-Degree-of-Freedom Model (Undamped)
 - Eigenvalues and Natural Frequencies
 - Modal Analysis
 - More Than Two Degrees of Freedom
 - Systems with Viscous Damping
 - Modal Analysis of the Forced Response
 - Lagrange's Equations
 - Examples
 - Computational Eigenvalue Problems of Vibration
 - Numerical Simulation of the Time Response
- 5 Design for Vibration Suppression
 - Acceptable Levels of Vibration
 - Vibration Isolation

- Vibration Absorbers
- Damping in Vibration Absorption
- Optimization
- Viscoelastic Damping Treatments
- Critical Speeds of Rotating Disks
- Active Vibration Suppression
- Practical Isolation Design
- 6 Distributed-Parameter Systems
- Vibration of a String of Cable
- Modes and Natural Frequencies
- Vibration of Rods and Bars
- Torsional Vibration
- Bending Vibration of a Beam
- Vibration of Membranes and plates
- Models of Damping
- Modal Analysis and the Forced Response
- 7 Vibration Testing and Experimental Modal Analysis
- Measurement Hardware
- Digital Signal Processing
- Random Signal Analysis in Testing
- Modal Data Extraction
- Model Parameter by Circle Fitting
- Mode Shape Measurement
- Vibration Testing for Endurance and Diagnostics
- Operational Deflection Shape Measurement
- 8 Finite Element Method
- Example: The Bar
- Three-Element Bar
- Beam Elements
- Lumped Mass Matrices
- Trusses
- Model Reduction
- Appendix A Complex Numbers and Functions
- Appendix B Laplace Transforms
- Appendix C Matrix Basics
- Appendix D The Vibration Literature
- Appendix E List of Symbols
- Appendix F Introduction to MATLAB[®], Mathcad[®], and Mathematica[®]
- Appendix G Engineering Vibration Toolbox and Web Support
- References
- Answers to Selected Problems
- Index