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Autore	Newland D. E (David Edward)
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Nota di contenuto	Cover; Title Page; Copyright Page; Contents; Preface; Disclaimer of warranty; Selected topics for a first course on vibration analysis and computation; Acknowledgements; Chapter 1: Fundamental concepts; General solution for one degree of freedom; Steady-state harmonic response; Expansion of the frequency-response function in partial fractions; Negative frequencies; Root locus diagram; Impulse response; Special case of repeated eigenvalues; Chapter 2: Frequency response of linear systems; General form of the frequency-response function; Example of vibration isolation Logarithmic and polar plotsGeneral expansion in partial fractions; Expansion for complex eigenvalues; Numerical examples; Example 2.1: Undamped response; Example 2.2: Undamped mode shapes; Example

2.3: Damped response; Example 2.4: Logarithmic and polar plots of the damped response; Partial-fraction expansion when there are repeated eigenvalues; Frequency response of composite systems; Natural frequencies of composite systems; Chapter 3: General response properties; Terminology; Properties of logarithmic response diagrams; Receptance graphs; Properties of the skeleton; Mobility graphs Reciprocity relationsMeasures of damping; Logarithmic decrement; Bandwidth; Energy dissipation; Modal energy; Proportional energy loss per cycle; Loss angle of a resilient element; Forced harmonic vibration with hysteretic damping; Numerical example; Time for resonant oscillations to build up; Acceleration through resonance; Chapter 4: Matrix analysis; First-order formulation of the equation of motion; Eigenvalues of the characteristic equation; Example 4.1: Finding the A-matrix and its eigenvalues; Example 4.2: Calculating eigenvalues; Eigenvectors; Normal coordinates
Example 4.3: Uncoupling the equations of motionGeneral solution for arbitrary excitation; Application to a single-degree-of-freedom system; Solution for the harmonic response; Comparison with the general expansion in partial fractions; Case of coupled second-order equations; Example 4.4: Transforming to nth-order form; Reduction of M second-order equations to 2M first-order equations; General solution of M coupled second-order equations; Example 4.5: General response calculation; Chapter 5: Natural frequencies and mode shapes; Introduction; Conservative systems
Example calculations for undamped free vibrationExample 5.1: Systems with three degrees of freedom; Example 5.2: Bending vibrations of a tall chimney; Example 5.3: Torsional vibrations of a diesel-electric generator system; Non-conservative systems; Example calculations for damped free vibration; Example 5.4: Systems with three degrees of freedom; Interpretation of complex eigenvalues and eigenvectors; Example 5.5: Damped vibrations of a tall chimney; Example 5.6: Stability of a railway bogie; Checks on accuracy; Chapter 6: Singular and defective matrices; Singular mass matrix
Three-degree-of-freedom system with a singular mass matrix

Sommario/riassunto

Focusing on applications rather than rigorous proofs, this volume is suitable for upper-level undergraduates and graduate students concerned with vibration problems. In addition, it serves as a practical handbook for performing vibration calculations.An introductory chapter on fundamental concepts is succeeded by explorations of frequency response of linear systems and general response properties, matrix analysis, natural frequencies and mode shapes, singular and defective matrices, and numerical methods for modal analysis. Additional topics include response functions and their applications, d