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| Nota di contenuto | Analytical and Numerical Methods for Vibration Analyses; Contents; About the Author; Preface; 1 Introduction to Structural Vibrations; 1.1 Terminology; 1.2 Types of Vibration; 1.3 Objectives of Vibration Analyses; 1.3.1 Free Vibration Analysis; 1.3.2 Forced Vibration Analysis; 1.4 Global and Local Vibrations; 1.5 Theoretical Approaches to Structural Vibrations; References; 2 Analytical Solutions for Uniform Continuous Systems; 2.1 Methods for Obtaining Equations of Motion of a Vibrating System; 2.2 Vibration of a Stretched String; 2.2.1 Equation of Motion
2.2.2 Free Vibration of a Uniform Clamped-Clamped String 2.3 |

Longitudinal Vibration of a Continuous Rod; 2.3.1 Equation of Motion; 2.3.2 Free Vibration of a Uniform Rod; 2.4 Torsional Vibration of a Continuous Shaft; 2.4.1 Equation of Motion; 2.4.2 Free Vibration of a Uniform Shaft; 2.5 Flexural Vibration of a Continuous Euler-Bernoulli Beam; 2.5.1 Equation of Motion; 2.5.2 Free Vibration of a Uniform Euler-Bernoulli Beam; 2.5.3 Numerical Example; 2.6 Vibration of Axial-Loaded Uniform Euler-Bernoulli Beam; 2.6.1 Equation of Motion; 2.6.2 Free Vibration of an Axial-Loaded Uniform Beam; 2.6.3 Numerical Example; 2.6.4 Critical Buckling Load of a Uniform Euler-Bernoulli Beam; 2.7 Vibration of an Euler-Bernoulli Beam on the Elastic Foundation; 2.7.1 Influence of Stiffness Ratio and Total Beam Length; 2.7.2 Influence of Supporting Conditions of the Beam; 2.8 Vibration of an Axial-Loaded Euler Beam on the Elastic Foundation; 2.8.1 Equation of Motion; 2.8.2 Free Vibration of a Uniform Beam; 2.8.3 Numerical Example; 2.9 Flexural Vibration of a Continuous Timoshenko Beam; 2.9.1 Equation of Motion; 2.9.2 Free Vibration of a Uniform Timoshenko Beam; 2.9.3 Numerical Example; 2.10 Vibrations of a Shear Beam and a Rotary Beam; 2.10.1 Free Vibration of a Shear Beam; 2.10.2 Free Vibration of a Rotary Beam; 2.11 Vibration of an Axial-Loaded Timoshenko Beam; 2.11.1 Equation of Motion; 2.11.2 Free Vibration of an Axial-Loaded Uniform Timoshenko Beam; 2.11.3 Numerical Example; 2.12 Vibration of a Timoshenko Beam on the Elastic Foundation; 2.12.1 Equation of Motion; 2.12.2 Free Vibration of a Uniform Beam on the Elastic Foundation; 2.12.3 Numerical Example; 2.13 Vibration of an Axial-Loaded Timoshenko Beam on the Elastic Foundation; 2.13.1 Equation of Motion; 2.13.2 Free Vibration of a Uniform Timoshenko Beam; 2.13.3 Numerical Example; 2.14 Vibration of Membranes; 2.14.1 Free Vibration of a Rectangular Membrane; 2.14.2 Free Vibration of a Circular Membrane; 2.15 Vibration of Flat Plates; 2.15.1 Free Vibration of a Rectangular Plate; 2.15.2 Free Vibration of a Circular Plate; References; 3 Analytical Solutions for Non-Uniform Continuous Systems: Tapered Beams; 3.1 Longitudinal Vibration of a Conical Rod; 3.1.1 Determination of Natural Frequencies and Natural Mode Shapes; 3.1.2 Determination of Normal Mode Shapes; 3.1.3 Numerical Examples; 3.2 Torsional Vibration of a Conical Shaft

Sommario/riassunto

"This book illustrates theories and associated mathematical expressions with numerical examples using various methods, leading to exact solutions, more accurate results, and more computationally efficient techniques. It presents the derivations of the equations of motion for all structure foundations using either the continuous model or the discrete model. It discusses applications for students taking courses including vibration mechanics, dynamics of structures, and finite element analyses of structures, the transfer matrix method, and Jacobi method"--

"A book to introduce the theories or methods presented in some of the author's publications appearing in the international journals"--