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2.3.1 Cantilevered Beam without a Tip Mass under Base Excitation; 2.3.2 Cantilevered Beam with a Tip Mass under Base Excitation; 2.4 Base Excitation Problem for Longitudinal Vibrations and Correction of its Lumped-Parameter Model; 2.4.1 Analytical Modal Analysis and Steady-State Response to Harmonic Base Excitation; 2.4.2 Correction Factor for Longitudinal Vibrations; 2.5 Correction Factor in the Electromechanically Coupled Lumped-Parameter Equations and a Theoretical Case Study
2.5.1 An Electromechanically Coupled Lumped-Parameter Model for Piezoelectric Energy Harvesting2.5.2 Correction Factor in the Electromechanically Coupled Lumped-Parameter Model and a Theoretical Case Study; 2.6 Summary; 2.7 Chapter Notes; References; 3 Analytical Distributed-Parameter Electromechanical Modeling of Cantilevered Piezoelectric Energy Harvesters; 3.1 Fundamentals of the Electromechanically Coupled Distributed-Parameter Model; 3.1.1 Modeling Assumptions and Bimorph Configurations; 3.1.2 Coupled Mechanical Equation and Modal Analysis of Bimorph Cantilevers
3.1.3 Coupled Electrical Circuit Equation of a Thin Piezoceramic Layer under Dynamic Bending3.2 Series Connection of the Piezoceramic Layers; 3.2.1 Coupled Beam Equation in Modal Coordinates; 3.2.2 Coupled Electrical Circuit Equation; 3.2.3 Closed-Form Voltage Response and Vibration Response at Steady State; 3.3 Parallel Connection of the Piezoceramic Layers; 3.3.1 Coupled Beam Equation in Modal Coordinates; 3.3.2 Coupled Electrical Circuit Equation; 3.3.3 Closed-Form Voltage Response and Vibration Response at Steady State 3.4 Equivalent Representation of the Series and the Parallel Connection Cases

Sommario/riassunto

The transformation of vibrations into electric energy through the use of piezoelectric devices is an exciting and rapidly developing area of research with a widening range of applications constantly materialising. With Piezoelectric Energy Harvesting, world-leading researchers provide a timely and comprehensive coverage of the electromechanical modelling and applications of piezoelectric energy harvesters. They present principal modelling approaches, synthesizing fundamental material related to mechanical, aerospace, civil, electrical and materials engineering disciplines for vibration-