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Nota di contenuto	PIEZOELECTRIC ENERGY HARVESTING; Contents; About the Authors; Preface; 1 Introduction to Piezoelectric Energy Harvesting; 1.1 Vibration-Based Energy Harvesting Using Piezoelectric Transduction; 1.2 An Example of a Piezoelectric Energy Harvesting System; 1.3 Mathematical Modeling of Piezoelectric Energy Harvesters; 1.4 Summary of the Theory of Linear Piezoelectricity; 1.5 Outline of the Book; References; 2 Base Excitation Problem for Cantilevered Structures and Correction of the Lumped-Parameter Electromechanical Model 2.1 Base Excitation Problem for the Transverse Vibrations of a Cantilevered Thin Beam 2.1.1 Response to General Base Excitation; 2.1.2 Steady-State Response to Harmonic Base Excitation; 2.1.3 Lumped-Parameter Model of the Harmonic Base Excitation Problem; 2.1.4 Comparison of the Distributed-Parameter and the Lumped-Parameter Model Predictions; 2.2 Correction of the Lumped-Parameter Base Excitation Model for Transverse Vibrations; 2.2.1 Correction Factor for the Lumped-Parameter Model; 2.2.2 Effect of a Tip Mass on the Correction Factor 2.3 Experimental Case Studies for Validation of the Correction Factor

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 Harvesting 2.5.2 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 Bending 3.2 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

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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-

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