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Vibration Control Systems: The Bases -- Identification of the Test Benches in Open-Loop Operation -- Digital Control Strategies for Active Vibration Control: The Basis -- Identification in Closed-Loop Operation -- Reduction of Controller Complexity -- Part III: Active Damping -- Active Damping -- Part IV: Feedback Attenuation of Narrow-Band Disturbances -- Robust Controller Design for Feedback Attenuation of Narrow-Band Disturbances -- Robust Direct Adaptive Regulation of Unknown Narrow-Band Disturbances -- Robust Indirect Adaptive Regulation of Unknown Narrow-Band Disturbances -- Part V: Feedforward–Feedback Attenuation of Broad-Band Disturbances -- Adaptive Feedforward Compensation of Disturbances -- Adaptive Feedforward and Fixed Feedback Compensator of Broad-Band Disturbances -- Use of the Youla–Kuera Parametrization for Adaptive Feedforward Disturbance Compensation -- Part VI: Appendices: Generalized Stability Margin -- Integral and Proportional Parameter Adaptation Algorithm -- Adaptive Feedforward Compensation of Disturbances: Details.

Sommario/riassunto

This book approaches the design of active vibration control systems from the perspective of today’s ideas of computer control. It formulates the various design problems encountered in the active management of vibration as control problems and searches for the most appropriate tools to solve them. The experimental validation of the solutions proposed on relevant tests benches is also addressed. To promote the widespread acceptance of these techniques, the presentation eliminates unnecessary theoretical developments (which can be found elsewhere) and focuses on algorithms and their use. The solutions proposed cannot be fully understood and creatively exploited without a clear understanding of the basic concepts and methods, so these are considered in depth. The focus is on enhancing motivations, algorithm presentation and experimental evaluation. MATLAB®routines, Simulink® diagrams and bench-test data are available for download and encourage easy assimilation of the experimental and exemplary material. Three major problems are addressed in the book: active damping to improve the performance of passive absorbers; adaptive feedback attenuation of single and multiple tonal vibrations; and feedforward and feedback attenuation of broad band vibrations. Adaptive and Robust Active Vibration Control will interest practising engineers and help them to acquire new concepts and techniques with good practical validation. It can be used as the basis for a course for graduate students in mechanical, mechatronics, industrial electronics, aerospace and naval engineering. Readers working in active noise control will also discover techniques with a high degree of cross-over potential for use in their field.