Hybrid Control of Rotating Beams Treated with Layer Damping Treatment Using Pattern Search-Based Optimization Technique

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Abstract:

This paper presents experimental, hybrid, structural vibration control of smart structures. A rotating beam structure with surface-bonded piezo ceramic sensors/actuators is used for analysis. Passive constrained layer damping treatment has been combined with the stressed layer damping technique to enhance the damping characteristics of the flexible beam. To further enhance the damping parameters, closed-form robust feedback control has been applied to reduce the broadband structural vibrations of the rotating beam. The feed-forward controller has been designed in combination with the feedback controller using a pattern search-based optimization technique. The hybrid controller enhances the performance of the closed-loop system. A preliminary experimental study is also done to validate the effectiveness of the proposed technique.