Decentralized Stabilization of Vibrating Structures

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The work presents novel concepts of decentralized structural vibration control. The control is assumed to be realized by a semi-active device. The objective is to stabilize a vibrating system with the optimal rates of decrease of the energy. Two types of controllers, heuristic and optimal, are considered. Both controllers employ easy for implementation decentralized state-feedback structures. They utilize a set of communication channels to exchange the state information between the neighboring controllers. The performance of the designed controllers is validated by means of the numerical experiments performed for double cantilever system equipped with a set of elastomers with controlled viscoelastic properties. In terms of the assumed objectives, the proposed distributed method significantly outperforms the passive damping cases and is competitive to standard centralized control.