Decentralized Vibration Control Algorithms for Large Truss Structure

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Abstract

In order to solve the vibration suppression problem of a large truss structure, the truss bar embedded with piezoelectric material is used as the actuator, which can produce corresponding axial force to inhibit the vibration. The finite element method is used to establish the model, while applying the precise time-integration method, we can obtain the time-based solution for the Equations of motion. Meanwhile, feedback axial force only, feedback axial force based on PID control theory and feedback axial force based on LQ(Linear Quadratic) optimal control and decentralized control theory are separately applied to the structure. By comparison, LQ optimal control and decentralized control theory appears to be the best control theory for the given structure. By using this control method, the vibration of the large truss structure can be quickly and ultimately inhibited.

Key words: vibration control; truss structure; decentralized control; LQ optimal control; precise time-integration method

Acknowledgments

The support of the National Natural Science Foundation of China (11272071, 11432010) is gratefully acknowledged.

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