

Hybridization of active control and passive resonant shunt

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ABSTRACT

Resonant shunt circuit applied on a transducer like piezoelectric or voice coil is widely used as a passive control technique to damp a specific vibration mode. While very simple and robust, the damping capability is proportional to the electromechanical coupling of the transducer, which depicts a substantial shortcoming. On the other hand, one of the major difficulties that arises in practically implementation of purely active vibration control is the power consumption required for the actuator. The idea of hybrid control is proposed in this study to combine the active control to the passive shunt device in order to improve the performance with low power consumption. The control law considered in this case is a modified direct velocity feedback containing two poles and two zeros. The developed controller keeps the two poles of the closed-loop response always in the left half plane, which make the system hyperstable and unconditionally stable. In addition, the proposed controller is compared with the classical control law like direct velocity feedback in the term of vibration attenuation and power consumption.

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