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Springer Series in Materials Science
Volume 204, 2015, Pages 313-335

Dynamic effects of piezoelectric patch actuators on vibrational response of non-deterministic structures: Modelling and simulations   (Article)

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Abstract   ⌄ View references (11)

Many engineering systems such as aircraft and automotive are considered built-up structures, fabricated from components that are classified as deterministic subsystems (DS) and non-deterministic subsystems (Non-DS). The response of Non-DS is sensitive to minor details of material properties, geometry, connections and damping distribution; therefore create problems in vibration control. Hence, the response of Non-DS is estimated using statistical modelling technique such as statistical energy analysis (SEA), in which any external input to the subsystem must be represented in terms of power input. In this research, ensemble average of power delivered by a piezoelectric (PZT) patch actuator to a simply-supported plate when subjected to structural uncertainties is studied using Lagrangian method and obtained by Monte-Carlo simulation. The effects of size and location of the PZT patch actuators on the power delivered to the plate are investigated. It is found that changing the patch location on the structure will not affect the average power supplied by the patch while changing the patch size will change the power magnitude proportionally but with some variations at higher frequency. © Springer Science+Business Media Singapore 2015.

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