

Exploration of nonlinear shunting strategies as effective vibration absorbers

The tuned mass damper (TMD) is a simple and efficient device, but it is only effective when it is precisely tuned to the frequency of a particular vibration mode. In order to overcome this limitation, the nonlinear energy pumping phenomenon from a main mechanical structure to a local, passive nonlinear energy sink (NES) is investigated. Unlike the TMD, an NES has no preferential resonant frequency, which makes it a good candidate for vibration mitigation of MDOF linear and nonlinear vibrating structures. However, in addition to the rattle space requirements, the mechanical implementation of the nonlinear absorber poses serious challenges. This is why piezoelectric shunting is considered in this study. Specifically, the objective of the paper is to develop a suitable association of piezoelectric patches and nonlinear shunted electrical circuits, such that the effects of the NES would be electrically reproduced.