15th INTERNATIONAL CONFERENCE
Dynamical Systems — Theory and Applications
December 2-5, 2019. Lodz, POLAND.

DSTA 2019

paper id: VIB291

Synergetic effect of rotary and single-sided vibro-impact nonlinear energy sinks

Adnan S. Saeed, Mohammad AL-Shudeifat

Abstract: Nonlinear energy sinks (NESs) have been extensively investigated for employment in small- and large-scale dynamical structures to protect them from high amplitudes of vibration oscillation by engaging in rapid and passive targeted energy transfer. Accordingly, many types of NESs have been proposed and studied in the literature and those can be classified by the method of nonlinearly attaching the NES to the associated floor of the primary structure. Among those are the rotary NES in which a small mass is inertially coupled to the primary structure through a rigid arm allowing the mass to rotate about a vertical axis perpendicular to the motion of the primary structure and the single-sided vibro-impact NES in which a small mass, linearly coupled via stiffness and damping elements, is engaged in consecutive non-smooth inelastic impacts with the primary structure. Both types showed significant capability of passive and rapid energy transfer and dissipation. In this paper, both NES types are coupled to the same single degree-of-freedom primary structure and their combined performance is compared with a primary structure coupled to rotary NES or SSVI NES only. The total mass of the nonlinear absorbers is kept constant for all cases and it is found that the synergy of rotary and SSVI NESs enhances the capability of passively and rapidly transferring energy out of the primary structure.

[1)] Adnan S. Saeed, M.Sc. (Ph.D. student): Aerospace Engineering, Khalifa University of Science and Technology, Abu Dhabi, 127788, UAE, Khalifa University of Science and Technology, Abu Dhabi, 127788, UAE, United Arab Emirates (AE), adnansalem991@gmail.com.

[2)] Mohammad AL-Shudeifat, Associate Professor: Aerospace Engineering, Khalifa University of Science and Technolgy, Abu Dhabi, 127788, UAE, Khalifa University of Science and Technolgy, Abu Dhabi, 127788, UAE, United Arab Emirates (AE), mohd.shudeifat@ku.ac.ae.