World Academy of Science, Engineering and Technology
International Journal of Bioengineering and Life Sciences
Vol:9, No:05, 2015

Experimental and Theoratical Methods to Increase Core Damping for Sandwitch Cantilever Beam

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Abstract : The purpose behind this study is to predict damping effect for steel cantilever beam by using two methods of passive viscoelastic constrained layer damping. First method is Matlab Program, this method depend on the Ross, Kerwin and Unger (RKU) model for passive viscoelastic damping. Second method is experimental lab (frequency domain method), in this method used the half-power bandwidth method and can be used to determine the system loss factors for damped steel cantilever beam. The RKU method has been applied to a cantilever beam because beam is a major part of a structure and this prediction may further leads to utilize for different kinds of structural application according to design requirements in many industries. In this method of damping a simple cantilever beam is treated by making sandwich structure to make the beam damp, and this is usually done by using viscoelastic material as a core to ensure the damping effect. The use of viscoelastic layers constrained between elastic layers is known to be effective for damping of flexural vibrations of structures over a wide range of frequencies. The energy dissipated in these arrangements is due to shear deformation in the viscoelastic layers, which occurs due to flexural vibration of the structures. The theory of dynamic stability of elastic systems deals with the study of vibrations induced by pulsating loads that are parametric with respect to certain forms of deformation. There is a very good agreement of the experimental results with the theoretical findings. The main ideas of this thesis are to find the transition region for damped steel cantilever beam (4mm and 8mm thickness) from experimental lab and theoretical prediction (Matlab R2011a). Experimentally and theoretically proved that the transition region for two specimens occurs at modal frequency between mode 1 and mode 2, which give the best damping, maximum loss factor and maximum damping ratio, thus this type of viscoelastic material core (3M468) is very appropriate to use in automotive industry and in any mechanical application has modal frequency eventuate between mode 1 and mode 2.

Keywords : 3M-468 material core, loss factor and frequency, domain method, bioinformatics, biomedicine, MATLAB
Conference Title : ICBB 2015 : International Conference on Bioinformatics and Biomedicine
Conference Location : Istanbul, Türkiye
Conference Dates : May 21-22, 2015