VIBRATION ANALYSIS OF MULTILAYERED BEAMS WITH CONSTRAINED VISCOELASTIC LAYERS

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ABSTRACT

Equations of motion for flexural vibrations of unsymmetrical beam arrangements of general type with 'n' constrained viscoelastic layers and '(n+1)' constraining elastic layers have been derived using variational method. The detailed analysis of vibration damping characteristics of multilayered beams with simple supports and subjected to harmonic disturbances has been carried out. For this analysis, three criteria viz. constant weight, constant size and constant static stiffness have been introduced. Evaluation of damping effectiveness on the basis of system loss factor and displacement response effectiveness along with weight, size and static stiffness characteristics for the multilayered beams has been done. An approximate method for determination of response of multilayered beams with and without concentrated mass for arbitrary and conditions and subjected to deterministic harmonic disturbances has been evolved. Vibration response tests have been carried out on sandwich beams with fixed-fixed and cantilever type of end conditions, with and without concentrated mass. The theoretical results obtained from the approximate method have been compared with experimental results and thus the validity of the method

has been verified. Experimental work has also been done to determine the dynamic properties in shear of visco-elastic material, which has been used in making the sandwich beam test specimens.

C E R T I F I C A T E

This is to certify that the thesis entitled "Vibration Analysis of Multilayered Beams with constrained Viscoelastic Layers" being submitted by Mr. Nanik. Thakurdas. Asnani. to the Indian Institute of Technology, Delhi, for the award of the Degree of Doctor of Philosophy in Mechanical Engineering, is record of bonafide research work carried out by him. He has worked under my guidance and supervision and has fulfilled the requirements for the submission of this thesis, which has reached the requisite standard.

The results contained in this thesis have not been submitted in part or in full, to any other university or institute for the award of any degree or diploma.

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