

Abstract

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New approach to the computation of the form factor of viscoelastic cylinders

Periodic deformations of the viscoelastic elastomers were investigated numerically by solving the two-dimensional elastic wave equations. In order to enhance the accuracy of the viscoelastic material property calculations, a pseudospectral analysis method was employed. This allowed us to exclude the use of the dynamic form factor derived from the conventional 1D model. Based on the present 2D method, the validity of the conventional 1D form factor concept was evaluated. The present 2D method was used to calculate the vibration response of the elastomer samples under harmonic excitation. Obtained numerical results were compared with those using the simplest 1D model. Valid range of the form factor was examined. Empirical formulas to correct static and dynamic form factors for both normal deformation mode and the shear deformation mode, which are suitable for engineering applications, are suggested.