Abstract

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Numerical estimation of dynamic behavior of viscoelastic elastomer specimen

Dynamic deformation behavior of a cylindrical specimen made of viscoelastic elastomers was investigated numerically by solving the two-dimensional elastic wave equations. In order to enhance the accuracy of the viscoelastic property calculations, a pseudospectral analysis of two-dimensional elastic wave equation was employed. This allowed us to exclude the use of the form factor derived from the conventional one-dimensional model. Using the present method, an assessment of the conventional form factor concept was attempted. The present two-dimensional method was then utilized to predict a forced vibration response of the elastomer samples under periodic excitation. Obtained numerical results were compared with those using the simplest one-dimensional model. Applicable range of the form factor was examined. Empirical formulas to correct static and dynamic form factors for elastic deformation mode, which are suitable for engineering applications, are suggested.