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Multiple scattering of acoustic waves from two transversely isotropic cylinders

Sina Sodagar[a], Farhang Honarvar[a] and Anthony N. Sinclair[b]
[a]Faculty of Mechanical Engineering, K. N. Toosi University of Technology, Pardis St., Molla Sadra Ave., Vanak Sq., Postal code 1999143344, 16579 Tehran, Iran
[b]Department of Mechanical Engineering, University of Toronto, 5 King's College Road, Toronto, ON, Canada M5S 1A4

The study of the interaction of acoustic waves with cylindrical structures has numerous applications including the ultrasonic nondestructive testing of materials. The scattered pressure field from a submerged cylinder contains valuable information about its physical properties. Scattering of acoustic waves from single cylindrical components including solid cylinders, shells, and multilayered cylinders has been of interest during the past two decades. These studies include theoretical modeling, numerical calculations, and experimental measurements of the scattered field of these objects. The more complex problem of multiple scattering from a grating of cylindrical components has also been considered during the past few years. These studies usually deal with either rigid or isotropic cylindrical objects. In this paper, the mathematical modeling for the scattering of plane acoustic waves from two adjacent infinite anisotropic solid cylinders will be presented. The type of anisotropy considered is transverse isotropy (hexagonal symmetry). The mathematical model accounts for the effects of the scattered filed of each cylinder on the total resultant pressure field. Numerical calculations are used to verify the validity of the developed mathematical model.