ACOUSTICS2008/2348
Acoustic wave scattering from infinite cylinders made from functionally graded materials

Jalil Jamali, Farhang Honarvar and Mohammad Hasan Naei
Faculty of Mechanical Engineering, K. N. Toosi University of Technology, Pardis St., Molla Sadra Ave., Vanak Sq., Postal code 1999143344, 16579 Tehran, Iran

Functionally graded materials (FGM's) are superheat-resistive materials which show attractive properties in many applications including furnace liners. FGM's consist of two distinct materials, for example a ceramic and a metal alloy. These two materials are mixed such that the composition of each material changes continuously along a specific direction resulting in a continuous change of microstructure along that direction. The change in microstructure induces chemical, material, and microstructural gradients, and makes functionally graded materials different in behavior from homogeneous materials and traditional composites. In this paper, the scattering of an incident plane acoustic wave from an infinite solid cylinder made from functionally graded materials is studied. Expressions are derived for the far-field scattered pressure generated by illumination of the infinite FGM cylinder by an infinite plane acoustic wave. The propagation direction of the incident wave can make an arbitrary angle with the normal to the cylinder axis. The mathematical equations are derived and numerical results for cylinders made from specific functionally graded materials are presented at different incidence angles.