

عنوان مقاله:

An analytical model of sound transmission through an FG poroelastic cylinder

محل انتشار:

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خلاصه مقاله:

In the present paper, an analytical model for the propagation of sound waves through a functionally graded poroelastic (FGP) cylindrical shell has been investigated. The porosity of the FGP material changes along the thickness of the cylinder continuously which its distribution has a power-law volume fraction form. The cylindrical shell is considered to be made up of a finite number of layers and each layer is an isotropic, homogeneous poroelastic material. Also, a subsonic flow is traveling outside the shell. The extended full method which derived from the Biot's theory is applied to each layer. To establish local transfer matrices for each layer, the transfer matrix method (TMM) is used to form the global transfer matrix of the cylindrical shell. The sound transmission loss (TL) is computed for various characteristics such as, Mach number, inner and outer porosity. To validate the proposed model, the porosity of each layer is considered to be the same, thus the FGP cylindrical shell is converted to an isotropic cylindrical shell. From the results, it can be deduced that an FGP cylindrical shell significantly improves TL compared to an isotropic one in a broad-band of frequency range.

کلمات کلیدی:

sound transmission, functionally graded material, poroelastic cylindrical shell, transfer matrix method

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