Transient Wave Propagation and Early Short Time Transient Response Analysis of Piezoelectric Shells

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Abstract

The method of reverberation ray matrix (MRRM) have been successfully utilized to study the transient wave problem in beams, planar trusses and infinite layered solids. In this work, the MRRM is exploited to investigate the early short time transient responses of piezoelectric cylindrical shells with finite size under impact load. Based on the Donnell shell theory, the reverberation matrix in the dual local coordinates for a single layer in the cylindrical shell is derived. With the help of the Laplace transformation, the transient responses under imposed impact load can be predicted. Through the numerical simulations, the early short time transient responses can be further elucidated thoroughly.

Keywords: Donnell shell theory; the method of reverberation ray matrix; transient response