

Membrane carrier wave function in the modelling of Lamb wave propagation

Abstract:

Wave propagation in plates are multi-modal and dispersive by nature. Their behavior is highly dependent on the material properties. In homogeneous isotropic plates Lamb modes can be grouped into symmetric and anti-symmetric modes and they are decoupled from the shear modes. Due to the material isotropy, Lamb wave's propagation behavior is not dependent on the propagation direction. This property can be used to find analytical solutions for the field of displacements in the frequency domain. In this paper, series of numerical simulations on the Lamb wave propagation in homogeneous isotropic are presented. The concept of the membrane carrier wave is used together with integral transforms in the space domain, and analytical expressions are found for the response of a homogeneous isotropic plate under different load regimes. We considered line forces and axisymmetric loads applied to the plate. The procedure can be applied to other types of load distributions.