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Wave Interaction with Defects in Pressurized Composite Structures

Authors : R. K. Apalowo, D. Chronopoulos, V. Thierry

Abstract : A wave finite element (WFE) and finite element (FE) based computational method is presented by which the dispersion properties as well as the wave interaction coefficients for one-dimensional structural system can be predicted. The structural system is discretized as a system comprising a number of waveguides connected by a coupling joint. Uniform nodes are ensured at the interfaces of the coupling element with each waveguide. Then, equilibrium and continuity conditions are enforced at the interfaces. Wave propagation properties of each waveguide are calculated using the WFE method and the coupling element is modelled using the FE method. The scattering of waves through the coupling element, on which damage is modelled, is determined by coupling the FE and WFE models. Furthermore, the central aim is to evaluate the effect of pressurization on the wave dispersion and scattering characteristics of the prestressed structural system compared to that which is not prestressed. Numerical case studies are exhibited for two waveguides coupled through a coupling joint.

Keywords : Finite Element, Prestressed Structures,Wave Finite Element, Wave Propagation Properties, Wave Scattering Coefficients.
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