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Spectral Element Modelling of Wave Propagation in Isotropic and Anisotropic Flat Shell-Structures Including Delamination and Debonding

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During the last decades, guided wave based systems have shown great potential for SHM applications. These waves are excited and sensed by permanently installed piezoelectric elements offering online monitoring capability. However, the setup of these systems for complex structures may be very difficult and time consuming. For that reason there is a demand for efficient simulation tools providing the opportunity to design wave based SHM systems in a virtual environment. As usually high frequency waves are used, the associated short wavelength requires a very dense mesh, which makes conventional finite elements not well suited for this purpose.

Therefore a flat shell spectral element approach is presented in this contribution. By including electromechanical coupling a SHM system can be simulated entirely from actuator voltage to sensor voltage. Besides a comparison to measured data for anisotropic material including delamination, a numerical example of a more complex, stiffened shell structure with debonding is presented.

Ключевые слова:

Содержание.

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