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Spectral Analysis and Semi-Analytical Finite Element Method for Lamb Wave Simulation

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Considerable attention to the research community is recently devoted to the elastic wave-based health-monitoring techniques. For this reason, it is usually required to extract the main features of elastic guided waves such as waves in thin plates or Lamb waves. There are many methods to simulate the propagation of Lamb waves in plates. Among these we can find, the finite difference method, the finite element method, the finite strip element method or the local interaction simulation approach. We consider two other methods which have the potential to reduce the computational time; (i) spectral element method and (ii) semi-analytical finite element method. Both of these methods have their weak and strong points. In this report, comparison between both methods is made using simple models. The statement of the problem and the formulation corresponding to each methodology is presented. Lamb wave excitation and propagation is simulated in an infinite isotropic plate using (i) and (ii). The response at a point away from the excitation source is calculated by both methods. Using available analytical solutions, errors corresponding to each simulation are compared. The advantages and disadvantages on the use of one or the other method are discussed.

Ключевые слова:

Содержание.

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