

Generic Hybrid Models for Two-Dimensional Ultrasonic Guided Wave Problems

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Abstract : A thorough understanding of guided ultrasonic wave behavior in structures is essential for the application of existing Non Destructive Evaluation (NDE) technologies, as well as for the development of new methods. However, the analysis of guided wave phenomena is challenging because of their complex dispersive and multimodal nature. Although numerical solution procedures have proven to be very useful in this regard, the increasing complexity of features and defects to be considered, as well as the desire to improve the accuracy of inspection often imposes a large computational cost. Hybrid models that combine numerical solutions for wave scattering with faster alternative methods for wave propagation have long been considered as a solution to this problem. However usually such models require modification of the base code of the solution procedure. Here we aim to develop Generic Hybrid models that can be directly applied to any two different solution procedures. With this goal in mind, a Numerical Hybrid model and an Analytical-Numerical Hybrid model has been developed. The concept and implementation of these Hybrid models are discussed in this paper.

Keywords : guided ultrasonic waves, Finite Element Method (FEM), Hybrid model

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