

Scattering analysis of guided wave beam by defects in a plate with finite width

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Guided wave scattering arises in nondestructive testing (NDT) using ultrasonic guided waves. The guided waves display dispersion and multimodal characteristics, making it crucial to employ dispersion analysis to understand them [1]. Additionally, scattering analysis necessary to comprehend the received waves in NDT. Typically, numerical methods are used to conduct dispersion and scattering analyses. This study proposes a hybrid semi-analytical finite element-boundary element method (SAFE-BEM) for this purpose.

The dispersion curves for a three-dimensional plate with finite width are complex, making it challenging to directly employ them for the analysis of incident and received waves in experimental measurement. In conventional guided wave measurement, the incident and received waves are considered using two-dimensional dispersion curves for an infinite-width plate [2]. To understand the incident and received waves in terms of the two-dimensional dispersion properties, we examine the appropriate incident wave and scattered far-fields in numerical simulations. For this purpose, the Gaussian beam of plate wave [3] is considered as an incident wave.

References

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