DETECTION OF SMALL CRACKS VIA SUBSPACE MIGRATION WITH UNKNOWN FREQUENCY

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ABSTRACT

In the inverse scattering problem, it is well-known that subspace migration yields very accurate locations of small perfectly conducting cracks when the applied frequency is known. In contrast, when the applied frequency is unknown, inaccurate locations are identified via subspace migration with wrong frequency data. This phenomenon has been examined experimentally; however, the reason for its occurrence has not been theoretically investigated. In this study, we analyze the mathematical structure of subspace migration with an unknown frequency by establishing a relationship with Bessel functions of order zero of the first kind. The identified structure of subspace migration and the corresponding results of numerical simulations provide reasons for why subspace migration with an unknown frequency yields an inaccurate crack location and ideas for improvement.

REFERENCES