A MUSIC Algorithm for Crack Identification

Russell Luke

Mathematical Sciences, University of Delaware

rluke@math.udel.edu

Abstract

We develop a sampling method for the inverse scattering of time-harmonic plane waves by open arcs. We use the characterization of the scatterer in terms of the spectral data of the scattering matrix to construct a MUSIC-type indicator function for the location of the open arc. The methodology is analogous to recent results for scattering from bounded obstacles with Dirichlet boundary conditions [?]. Numerical examples show that the method is feasible and yields a fast visualization technique for the unknown arc. The method can be interpreted in terms of the construction of fields that do not scatter from the arcs, which opens the door to the design of wavefronts that avoid certain known features while targeting others.