

# FAST IMAGING OF PERFECTLY CONDUCTING, ARC-LIKE CRACKS VIA MULTI-FREQUENCY TOPOLOGICAL DERIVATIVE

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## ABSTRACT

We consider a fast, one-step iterative technique of imaging extended perfectly conducting cracks with Dirichlet boundary condition. In order to reconstruct the shape of cracks from scattered field data measured at the boundary, we introduce a topological derivative-based electromagnetic imaging function operated at several nonzero frequencies. The properties of the imaging function are carefully analyzed for the configurations of both symmetric and non-symmetric incident field directions. This analysis explains why the application of incident fields with symmetric direction operated at multiple frequencies guarantees a successful reconstruction. Various numerical simulations with noise-corrupted data are conducted to assess the performance, effectiveness, robustness, and limitations of the proposed technique.

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