Abstracts

Electromagnetic imaging for an imperfectly conducting cylinder by the genetic algorithm [medical application]

Chien-Ching Chiu and Wei-Ting Chen. "Electromagnetic imaging for an imperfectly conducting cylinder by the genetic algorithm [medical application]." 2000 Transactions on Microwave Theory and Techniques 48.11 (Nov. 2000, Part I [T-MTT] (Mini-Special Issue on RF/Microwave Applications in Medicine)): 1901-1905.

Presents a computational approach to the imaging of an imperfectly conducting cylinder by the genetic algorithm (GA). A conducting cylinder of unknown shape and conductivity scatters the incident wave in free space and the scattered field is recorded outside. Based on the boundary condition and the measured scattered field, a set of nonlinear integral equations is derived and the imaging problem is reformulated into an optimization problem. The GA is then employed to find out the global extreme solution of the cost function. Numerical results demonstrated that, even when the initial guess is far away from the exact one, good reconstruction has been obtained. In such a ease, the gradient-based methods often get trapped in a local extreme. In addition, the effect of Gaussian noise on the reconstruction results is investigated. Numerical results show that multiple incident directions permit good reconstruction of shape and, to a lesser extent, conductivity in the presence of noise in measured data.

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