Abstracts

Two-dimensional dielectric profile reconstruction based on spectral-domain moment method and nonlinear optimization

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A novel method for two-dimensional (2-D) profile reconstruction of dielectric objects, based on nonlinear optimization, is presented in this paper. The unknown dielectric profile is expressed in terms of Gaussian basis functions. The scattering integral equation (SIE) is discretized using a spectral-domain moment technique, where the unknown internal field is described as a superposition of a limited number of plane waves, resulting in a significant reduction of the associated computational cost. The inverse-scattering problem is solved by minimizing a cost function consisting of two terms: the first term represents the error between measured and predicted values of the scattered field, while the second term corresponds to the error in satisfying the SIE for the field in the interior of the scatterer. Accurate and efficient dielectric profile reconstructions of 2-D lossy scatterers of circular and square cross sections using synthetic scattered field data are presented, while the effect of various discretization parameters on the convergence of the method is studied in detail.

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