Neural Network Technique for Gaussian Reconstruction of Spatial Distribution of Complex Permittivity

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The problem of reconstruction of complex permittivity profiles in dielectric samples is considered. The spatial distribution of dielectric constant and the loss factor is approximated by Gaussian functions with unknown coefficients which are reconstructed using a neural network technique. The inputs of the network are scattering parameters from a closed waveguide system containing the dielectric sample whereas the outputs are the associated coefficients of the Gaussian functions. FDTD modeling is applied on the step of the neural network training. Numerical examples obtained for rectangular and cylindrical samples show excellent reconstruction of permittivity distributions represented by Gaussian profiles.