Abstracts

Artificial neural networks for fast and accurate EM-CAD of microwave circuits

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A novel approach for achieving fast and accurate computer-aided design (CAD) of microwave circuits is described. The proposed approach enhances the ability to utilize electromagnetic (EM) analysis techniques in an interactive CAD environment through the application of neurocomputing technology. Specifically, a multilayer perceptron neural network (MLPNN) is implemented to model monolithic microwave integrated circuit (MMIC) passive elements using the element's physical parameters. The strength of this approach is that only a minimum number of EM simulations of these passive elements are required to capture critical input-output relationships. The technique used to describe the data set required for model development is based on a statistical design of experiment (DoE) approach. Data generated from EM simulations are used to train the MLPNN which, once trained, is capable of modeling passive elements not included in the training set. The results presented indicate that the MLPNN can predict the s-parameters of these passive elements to nearly the same degree of accuracy as that afforded by EM simulation. The correlations between the MLPNN-computed and EM-simulated results are greater than 0.98 for each modeled parameter.

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