Abstracts

On nonlinear modeling of microwave devices using interpolating wavelets

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Nonlinear semiconductor devices are modeled using the sparse point representation based upon interpolating wavelets. The functions of potential, fields, electron, and hole current densities inside the device are represented by a twofold expansion in scaling functions and wavelets. In most regions where the functions are smoothly varying, only scaling functions are employed as the bases. In contrast, in small regions with sharp material or field variations, additional basis functions, i.e., wavelets, are introduced. A nonuniform mesh generated in this manner is fully adaptive, dynamic, and object oriented. Examples of device simulations are presented, demonstrating good agreement with published literature and commercial software. The numerical examples also show substantial savings in computer memory for electrically large problems.

❑ Return to main document.