

Scattering analysis using fictitious wavelet array sources

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Abstract—In this paper we study the incorporation of wavelet-transforms into the source-model technique (SMT) for efficient analysis of electromagnetic scattering problems. The idea is to divide the discrete sources into groups of arrays with wavelet amplitude distributions. We refer to these array sources as *fictitious wavelet array sources*. They can be readily formed by applying appropriate wavelet transformations to the original matrix equation obtained based on a conventional SMT solution. The transformed impedance-matrix obtained in this manner is then compressed and thus a substantially smaller matrix equation has to be solved. The conventional as well as the windowed Fourier transform variant of the wavelet transform are considered. The ease with which one can adjust the expansion for resolution of small features and for handling small perturbations in the scatterer geometry is demonstrated. A comparison with a conventional method of moments solution is presented to show the advantages and disadvantages of the new approach.