Abstracts

Convergence of Local and Average Values in Three-Dimensional Moment-Method Solutions (Short Papers)

M.J. Hagmann and R.L. Levin. "Convergence of Local and Average Values in Three-Dimensional Moment-Method Solutions (Short Papers)." 1985 Transactions on Microwave Theory and Techniques 33.7 (Jul. 1985 [T-MTT]): 649-654.

Block models using 8, 64, 216, 512, 1000, 1728, and 2744 cubical cells were used to evaluate the load and average specific absorption rate (SAR) for a dielectric cube irradiated by an EM plane wave. All seven models were used in examples for 0.5-cm and 2.5-cm saline cubes at 400 MHz and a 30-cm cube of biological tissue at 27.12 MHz. In each example, the solutions using 8 or 64 cells were similar to that for a sphere rather than a cube. Many cells are needed to approximate the sharp variation of the electric field near corners and edges of a dielectric cube. The heterogeneity of the electric field in an object having corners and edges causes a frequency-independent error (FIE) in addition to the more generally observed frequency-dependent error (FDE) associated with the electrical size of the object. FIE causes the average SAR to converge less rapidly than local values of SAR at locations distant from the corners and edges. An extrapolant is described that corrects for FDE but not FIE in order to estimate the volume average SAR.

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