Abstracts

Experimentally based modeling of field sources for three-dimensional computation of SAR in electromagnetic hyperthermia and treatment planning

M.L.D. Lumori. "Experimentally based modeling of field sources for three-dimensional computation of SAR in electromagnetic hyperthermia and treatment planning." 2000 Transactions on Microwave Theory and Techniques 48.9 (Sep. 2000 [T-MTT] (Mini-Special Issue on Research Reported at the 8th Topical Meeting on Electrical Performance of Electronic Packaging (EPEP) 1999)): 1522-1530.

Presents field source-modeling, for applications to hyperthermia, by utilizing experimental data from the paraxial region of a liquid muscle-like phantom irradiated by an aperture antenna. The data are used in an optimization algorithm, applied to a Gaussian beam model (GBM), to determine the source parameters for GBM-computations of specific absorption rates everywhere, accurate to within 1% (relative to the global maximum) of the experimental results. This paper also shows how the aperture and incident fields may be determined accurately by the GBM and links them to the electric-field integral equation (EFIE), as an example, to improve the accuracy of numerical computations of the electric or magnetic fields associated with the EFIE, the magnetic-field integral equation, or any other field formulations. It is further demonstrated that models of plane waves, or approximate source fields, predict power levels with significant, unacceptable errors. Finally, it is concluded that the GBM is a viable tool for characterizing aperture antennas used in hyperthermia for cancer therapy.

❑ Return to main document.