Abstracts

Gaussian Beam Representation of Aperture Fields in Layered, Lossy Media: Simulation and Experiment

M.L.D. Lumori, J.B. Andersen, M.K. Gopal and T.C. Cetas. "Gaussian Beam Representation of Aperture Fields in Layered, Lossy Media: Simulation and Experiment." 1990 Transactions on Microwave Theory and Techniques 38.11 (Nov. 1990 [T-MTT]): 1623-1630.

This paper demonstrates that a three-dimensional electromagnetic field of a given linear polarization, emanating from an aperture source and propagating in a lossy medium, can be represented by an astigmatic Gaussian beam with complex source coefficients. The values of the coefficients can be determined experimentally by scans of the phase and amplitude of the field in the electric and magnetic principal planes near the aperture by means of a monopole probe and a liquid phantom (a phantom being a device that simulates the conditions encountered when radiation (e.g. microwaves) is deposited in biological tissues (e.g. human muscles) and permits a quantitative estimation of its effects). Once the source parameters are obtained, computations of the field everywhere else can be achieved rapidly. The theory is verified experimentally for bounded, homogeneous, and layered lossy media. Agreement is within 3% (relative to the maximum field at the aperture) over the entire scanned area.

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