Abstracts

Response of Insulated Electric Field Probes in Finite Heterogeneous Biological Bodies

S.H. Mousavinezhad, K.-M. Chen and D.P. Nyquist. "Response of Insulated Electric Field Probes in Finite Heterogeneous Biological Bodies." 1978 Transactions on Microwave Theory and Techniques 26.8 (Aug. 1978 [T-MTT] (Special Issue on Microwaves in Medicine, with Accent on the Application of Electromagnetics to Cancer Treatment)): 599-607.

An ideal probe for measuring the electric field inside a finite heterogeneous biological body should possess a constant calibration factor; probe effective length and equivalent impedance must therefore be independent of its location in the body. A practical probe with minimal variation of these parameters can be implemented by insulating the metallic probe with a thick low-loss dielectric coating of low permittivity. An idealized spherical probe, insulated by a dielectric layer and immersed in a finite lossy-dielectric body (representative of more general probes) is studied. Analytical expressions for the effective diameter and equivalent impedance of the probe are obtained. Numerical results indicate that the variation of these parameters with probe location is minimized by coating the probe with a relatively thick low-permittivity dielectric layer. Experimental impedance and electric field measurements confirm this conclusion. Limitation of using this probe in biological media with low dieletric constants is discussed.

❑ Return to main document.