Abstracts

Waveguide Technique for the Calibration of Miniature Implantable Electric-Field Probes for Use in Microwave-Bioeffects Studies

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A new S-band waveguide technique has been developed for the calibration of miniature probes used in determining electric fields in biological tissues at 2.45 GHz. A section of waveguide is filled with tissue-equivalent liquid separated from the air-filled waveguide by a very thin (0.25-mm) planar dielectric spacer. The probe response is measured as a function of position on each side of the spacer and extrapolated to the interface. The ratio of probe response in air to that in test liquid is then determined assuming continuity of tangential E-field across the spacer. In the water-glycerol solution modelling wet tissue, the probes are 3.0±0.6 times more sensitive to E^2 than in air. A wide variety of both wet and dry tissues may be simulated using liquids of different dielectric properties--a check on the properties is provided by comparing the measured depth of penetration of the wave in the liquid with the calculated value. Problems using the probes in biological tissues are also discussed.

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