Abstracts

The Calculated and Measured Temperature Distribution of a Phased Interstitial Antenna Array

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The power deposition pattern of four antennas, positioned on the corners of a 2 cm square array with different driving phase is computed under the assumption of negligible coupling between the antennas. The spatial SAR (specific absorption rate) distribution is calculated by modeling each interstitial applicator as an insulated, asymmetric dipole. For comparison with the heating patterns measured by a thermal video system, the calculated SAR distributions are converted into temperature patterns through an electric network simulation of the heating in artificial muscle tissue. At each nodal point of a grid in the thermal system, the absorbed microwave power (or SAR times density), thermal resistivity, heat capacitance, and temperature are simulated, respectively, as current source, electrical resistance, electrical capacitance, and potential. Therefore, solving the equivalent electric network on a computerized simulation routine (SPICE) yields the temperature distribution. In both the axial and transverse planes, the resulting temperature distributions from the antenna array, with various driving phases, agree very well with the measured temperature patterns.

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