Abstracts

Optimal Source Distribution for Hyperthermia at the Center of a Sphere of Muscle Tissue

C.M. Rappaport and F.R. Morgenthaler. "Optimal Source Distribution for Hyperthermia at the Center of a Sphere of Muscle Tissue." 1987 Transactions on Microwave Theory and Techniques 35.12 (Dec. 1987 [T-MTT] (1987 Symposium Issue)): 1322-1327.

In noninvasive electromagnetic hyperthermia it is important that applicators deposit as least as much power at the tumor as anywhere else in the intervening tissue. This study determines the ideal penetration limits for heating the center of a volume of muscle tissue according to this constraint. First, it is shown that the most efficiently heated volume is a sphere. Then, using both a diffraction integral formulation and a spherical harmonic modal approach, field distributions within the sphere are derived. It is shown that combining odd harmonics can generate a nearly uniform surface power distribution, and that this distribution is optimal. The power deposition patterns for these distributions for various standard frequencies are presented. It is concluded that 915 MHz is the best frequency for heating spheres less than 9.5 cm in radius.

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