Abstracts

Computation of the Electromagnetic Fields and Induced Temperatures Within a Model of the Microwave-Irradiated Human Eye

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The electromagnetic fields within a detailed model of the human eye and its surrounding bony orbit are calculated for two different frequencies of plane-wave irradiation: 750 MHz and 1.5 GHz. The computation is performed with a finite-difference algorithm for the time-dependent Maxwell's equations, carried out to the sinusoidal steady state. The heating potential, derived from the square of the electric field, is used to calculate the temperatures induced within the eyeball of the model. This computation is performed with the implicit alternating-direction (IAD) algorithm for the heat conduction equation. Using an order-of-magnitude estimate of the heat-sinking capacity of the retinal blood supply, it is determined that a hot spot exceeding 40.4°C occurs at the center of the model eyeball at an incident power level of 100 mW/cm² at 1.5 GHz.

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