Abstracts

Electromagnetic Absorption in the Human Head and Neck for Mobile Telephones at 835 and 1900 MHz

O.P. Gandhi, G. Lazzi and C.M. Furse. "Electromagnetic Absorption in the Human Head and Neck for Mobile Telephones at 835 and 1900 MHz." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): 1884-1897.

We have used the finite-difference time-domain method and a new millimeter-resolution anatomically based model of the human to study electromagnetic energy coupled to the head due to mobile telephones at 835 and 1900 MHz. Assuming reduced dimensions characteristic of today's mobile telephones, we have obtained SAR distributions for two different lengths of monopole antennas of lengths lambda/4 and 3lambda/8 for a model of the adult male and reduced-scale models of 10- and 5-year-old children and find that peak one-voxel and 1-g SAR's are larger for the smaller models of children, particularly at 835 MHz. Also, a larger in-depth penetration of absorbed energy for these smaller models is obtained. We have also studied the effect of using the widely disparate tissue properties reported in the literature and of using homogeneous instead of the anatomically realistic heterogeneous models on the SAR distributions. Homogeneous models are shown to grossly overestimate both the peak 1-voxel and 1-g SAR's. Last, we show that it is possible to use truncated one-half or one-third models of the human head with negligible errors in the calculated SAR distributions. This simplification will allow considerable savings in computer memory and computation times.

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