Abstracts

SAR distribution and temperature increase in an anatomical model of the human eye exposed to the field radiated by the user antenna in a wireless LAN

P. Bernardi, M. Cavagnaro, S. Pisa and E. Piuzzi. "SAR distribution and temperature increase in an anatomical model of the human eye exposed to the field radiated by the user antenna in a wireless LAN." 1998 Transactions on Microwave Theory and Techniques 46.12 (Dec. 1998, Part I [T-MTT]): 2074-2082.

Wireless personal communication is a rapidly expanding sector, particularly in the field of cellular mobile phones and wireless local area networks (WLAN's). In an indoor WLAN system, the user of the mobile terminal can find himself in close proximity to the radiating antenna. It is, therefore, important to consider possible health hazards due to this type of exposure. As the most considered adverse effects of the electromagnetic (EM) fields are of thermal nature, particularly with reference to the eye, in this paper, the authors have evaluated the temperature increase induced in a human eye exposed to WLAN-like fields. In particular, they have considered possible WLAN's operating in the range between 6-30 GHz, so that the incident field can be simulated via a plane wave. As a first step, the authors have computed the specific absorption rate (SAR) distribution in a human-eye anatomical model, developed from the "visible human" data set, by using the finite-difference time-domain (FDTD) numerical technique with a cell resolution of 0.5 mm. Starting from the calculated SAR values, the heating distribution has been derived through the bioheat equation, which has been solved using an explicit finite-difference scheme. Temperature increases of the order of 0.04/spl deg/C have been calculated in the eye lens with an incident power density of 1 mW/cm/sup 2/ at 6 GHz. Lower heating is obtained in the lens when the frequency increases. Finally, considerations about the exposure limits in the considered frequency range are made.

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