Abstracts

Modeling of interaction of electromagnetic fields from a cellular telephone with hearing aids (Nov. 1998, Part I [T-MTT])

M. Okoniewski and M.A. Stuchly. "Modeling of interaction of electromagnetic fields from a cellular telephone with hearing aids (Nov. 1998, Part I [T-MTT])." 1998 Transactions on Microwave Theory and Techniques 46.11 (Nov. 1998, Part I [T-MTT]): 1686-1693.

The new generation of cellular telephones and other personal communication services (PCSs) poses new problems and challenges in interactions with the human body, Among them is electromagnetic interference (EMI) with medical devices, particularly for systems using time-division multiple access (TDMA). Hearing aids are among the devices affected by the pulse modulation in the audio range associated with the TDMA systems. While EMI in this case does not generally pose a health risk, it constitutes a considerable annoyance, which may prevent the hearing-aid wearers from using some of the new communication devices. Also, just proximity to the devices used by others or the base station may result in signals sufficient to interfere with proper perception of sounds, We have evaluated the electric and magnetic fields in the ear canal at 900 MHz for a typical monopole antenna on a typical handset, an equivalent dipole, and a plane wave. Special care was taken to properly represent the anatomy of the ear, including its canal. The finite-difference time-domain (FDTD) method was used to compute the electric and magnetic fields in the ear canal and around the ear. The fields from the exposure sources in various realistic placements of the hearing aid were compared. The results presented are of importance and use in developing performance standards and practical testing methods for various types of hearing aids.

❑ Return to main document.