Abstracts

Integrated models for the analysis of biological effects of EM fields used for mobile communications

F. Apollonio, M. Liberti, G. D'Inzeo and L. Tarricone. "Integrated models for the analysis of biological effects of EM fields used for mobile communications." 2000 Transactions on Microwave Theory and Techniques 48.11 (Nov. 2000, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): 2082-2093.

The understanding of the modalities of interaction of electromagnetic (EM) fields with biological material is a key point in the identification of possible induced effects. Since the beginnings of bioelectromagnetic research studies, most of the attention has been focused on the effects on nervous systems and neuronal cells. The importance of this target has recently increased due to the wide diffusion of mobile terminals, used close to the head. In this paper, an integrated interaction model is proposed. The model, validated in each part of its components with experimental data, allows to obtain a quantitative link from the external applied field to the effects on neurons (isolated or linked to similar others). The models is firstly based on the evaluation of the EM field at cellular membrane level, then on the evaluation of the effects induced on each component of the model growing from the low biophysical level (membrane channels) to the biological one (neuron time behavior). The use of well-assessed models for the simulations of each part allows both the evaluation of the effect at different levels of complexity and the employment of this effect acting as an input on the upper level. This approach allows, for the first time, a complete quantitative evaluation of the effects on neurons due to the fields from the existing mobile systems, and can be a useful instrument for the evaluation of the possible health impact of new technologies.

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