Abstracts

Electromagnetic Coupling Between a Thin-Wire Antenna and a Neighboring Biological Body: Theory and Experiment

K. Karimullah, K.-M. Chen and D.P. Nyquist. "Electromagnetic Coupling Between a Thin-Wire Antenna and a Neighboring Biological Body: Theory and Experiment." 1980 Transactions on Microwave Theory and Techniques 28.11 (Nov. 1980, Part I [T-MTT]): 1218-1225.

Interaction between the near-zone EM field of a radiating antenna and a neighboring biological body is analyzed by considering the antenna current and the induced electric field in the body as unknown functions. A simultaneous pair of coupled tensor integral equations is developed for these unknown functions. These equations are solved numerically by the method of moments using pulse function expansions for the unknowns and delta functions for testing. A monopole antenna coupled with a rectangular-cylindrical body model is used for the experimental verification of theoretical results. Accuracy of the numerical solution is substantiated by good agreement between the numerical and experimental results obtained for the antenna impedance and current distribution as well as the induced electric field in the body. Electromagnetic (EM) radiation effects in various computer models of the human body are investigated to make a realistic assessment of potential radiation hazard associated with the coupled antenna-body system. It is found that an operator in the immediate vicinity of high-power transmitters may be exposed to harmful levels of radiation.

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