Abstracts

Human Whole-Body Radiofrequency Absorption Studies Using a TEM-Cell Exposure System

D.A. Hill. "Human Whole-Body Radiofrequency Absorption Studies Using a TEM-Cell Exposure System." 1982 Transactions on Microwave Theory and Techniques 30.11 (Nov. 1982 [T-MTT]): 1847-1854.

A system has been constructed for measuring radiofrequency absorption in the human body resulting from exposure to high-frequency (HF) electromagnetic radiation. The exposure chamber is a 6.1 X 7.3 X 13.0-m rectangular-coaxial transverse-electromagnetic (TEM) cell. The absorbed power, determined from signal-averaged measurements of incident, reflected, and transmitted power, is measured to a precision of 0.06 percent of incident power (0.003 dB in insertion loss). A detailed analysis of systematic errors in the method has shown that a directional-coupler directivity approaching 50 dB is necessary for high accuracy in absorbed-power measurements and that any dielectric-loading effect of the subject on the cell absorption is undetectable. The total systematic error in determining absorption rate per unit exposure rate is about ±35 percent of the measurement. Operating frequencies are currently limited to the 3 to 20-MHz range due to the occurrence of the first cell resonance, associated with the TE/sub 01/ mode, at 20.7 MHz. The first set of human whole-body absorption results is presented for three subjects exposed in free space to 11 μW/cm² at 18.5 MHz in six different body orientations with respect to the TEM wave. The measured absorption rates for the two principal E orientations are larger than the published predictions by a factor of 2 to 3.

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