

A SYSTEM FOR DETERMINING THE RADIOFREQUENCY ABSORPTION
COEFFICIENT OF THE HUMAN BODY IN THE HIGH FREQUENCY BAND

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A system has been constructed for measuring radio-frequency absorption in the human body resulting from exposure to 10-26 MHz electromagnetic radiation. Both free-space and grounded conditions can be simulated. The subject is positioned between the vertical septum and outer wall of a 12.2 m long x 7.3 m wide x 6.1 m high rectangular coaxial TEM cell (1). An exceptionally precise, stable and low-noise measurement system has been constructed. The final precision in the power absorption measurement, after computer averaging, is $\pm 0.05\%$ of incident power (± 0.002 dB in insertion loss). The E and H fields in the cell are measured by a small dipole and circular loop antenna, respectively. From 20-30 MHz the TEM mode field pattern is altered by the TE₀₁ and TE₁₀ travelling modes and various resonant standing wave patterns in all three components of E and H. The largest field gradient is the 50-60% change in the septum-to-wall direction over the 1.8 m length of a subject lying in the EKH (ellipsoid-equivalent) orientation.

We have made 17 preliminary measurements on 3 volunteers at 23.25 MHz. The absorption results are reproducible for any one subject but differ between subjects. With 400 W of incident power, producing a nominal power density of 1 mW/cm², the subject absorbs only 0 to 2 W. Volunteers in the EKH orientation absorb more than when in the KEH orientation. The EKH absorption is significantly more than predicted by the ellipsoid model. We have yet to evaluate the three main corrections to our measurement required to reduce it to a free-space uniform-plane-wave-equivalent value. Therefore, such a value is not given at this time.

* (1) S.C. Kashyap and F.R. Hunt. "A low frequency (<35 MHz) facility for biological absorption measurements". NRCC Division of Electrical Engineering Report #ERB-904 Sept. 1977.

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(To be signed in full showing Appointment, Telephone Number and Date)

Dr. Glasser

Zory,

You can reference and quote the abstract, but please do not refer to any of the data in the summary, as it is too preliminary.

For example, we know of seven corrections to the data which need to be evaluated before it can be directly compared to the calculations for an ideal uniform free space plane-wave exposure.

Good luck with your criteria document.

Douglas Hill



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 U "measurements". NRCC Division
 Report #ERB-904 Sept. 1977.