

"ESTIMATION OF INTERNAL POWER ABSORPTION BY  
HUMAN HEADS IN PRESENCE OF ELECTROMAGNETIC  
RADIATION"



ABSTRACT

Much data have been accumulated on the interaction of electromagnetic waves with various sphere models, simulating the human head. Here prolate spheroid and ellipsoidal models are used to estimate the power absorption. In order to obtain a quantitative description of the absorbed electromagnetic power distribution with human heads (both adult and infant), a perturbation technique is used to evaluate the internal electric field and then to estimate the time-averaged specific absorbed power and space-averaged specific absorbed power.

Two cases are examined, one is the simulation of an adult head by prolate spheroid and ellipsoid models of an equivalent sphere volume of 10 cms. radius, which represent an idealized adult head. The second case is the simulation of 5 cm. sphere radius by prolate spheroid and ellipsoid models which represent an infant head. Using prolate spheroid models, magnetic, electric and cross polarizations with respect to incident field vectors are used. For ellipsoid model six polarizations like EKH, EHK, KEH, HKE, HEK and HKE are used. The expressions for internal fields, specific time-averaged absorbed power and space-averaged specific absorbed power are derived and are applied further for human adult and infant heads. A comparative study is made with the available experimental results of certain animals. Finally it is concluded that ellipsoidal model is better than spheroid and sphere types. Further discussion is made from human safety point of view, regarding the minimum and maximum power absorption for different polarizations of the incident fields.