Abstracts

Near-Field Absorption in Prolate Spheroidal Models of Humans Exposed to a Small Loop Antenna of Arbitrary Orientation

A. Lakhtakia, M.F. Iskander, C.H. Durney and H. Massoudi. "Near-Field Absorption in Prolate Spheroidal Models of Humans Exposed to a Small Loop Antenna of Arbitrary Orientation." 1981 Transactions on Microwave Theory and Techniques 29.6 (Jun. 1981, Part I [T-MTT]): 588-594.

The power absorption characteristics of the prolate spheroidal model of an average man have been studied when the model is exposed to the near fields of an arbitrarily located small loop antenna. An integral equation is formulated and the fields radiated by the loop are expanded in terms of the vector spherical harmonics. This equation is then solved using the extended boundary condition method (EBCM). For three different loop-spheroid configurations, the power distribution and the average SAR have been calculated as a function of the frequency and the separation distance. It is shown that the results obtained for separation distances larger than lambda/2 agree well with those obtained from the plane wave exposure case. Furthermore, the average SAR value calculated as a function of separation distance for the case where the magnetic dipole moment is aligned parallel to the major axis of the spheroid are found to oscillate around the constant value obtained from the H-polarized plane wave exposure case. On the other hand, the average SAR values for the E-polarization case (magnetic dipole is parallel to the spheroidal minor axis) are found to increase monotonically with the decrease in separation distance. It is also shown that despite the complicated nature of the near fields, the absorption characteristics can still be explained in terms of the variations of the incident radiation. These loop results, together with those obtained from other simple soures, can be used as building blocks in arriving at a qualitative understanding of the near-field absorption characteristics for more general exposure cases.

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