DESIGN OF A MOBILE PHONE ANTENNA TO REDUCE HEALTH RISKS

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Declaration

I hereby certify that this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any university or higher educational institution in Sri Lanka or abroad.

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Abstract

Mobile phones use Monopole antennas for communication. They have an omni-directional radiation pattern in the plane perpendicular to the monopole. Mobile phones transmit high power electromagnetic waves to base stations. Some of these signals enter the user brain. Electromagnetic radiation associated with these signals can heat the brain and can cause damage to the brain tissues. In this research the specific absorption rate (SAR) of the electromagnetic field inside the brain was calculated for different values of incident waves. Assuming the brain to be divided into 1000 cubic cells, calculations of SAR values were carried out for three cases of brain alone; for the brain and skull together; and for the brain, skull and the ears all together. The SAR values appear to be higher at middle than at the periphery of the brain and the maximum value of the SAR is below the safety standards set by British safety levels.

However, the exact biological effect due to electromagnetic radiation is not well understood, and therefore it is best that attempt is made to minimize such absorption. This is because that there is some evidence to suggest that use of mobile phones could bring health hazards. Thus, an attempt was made to design a better antenna for the mobile unit, which would reduce the electromagnetic wave propagation to the head of a user. A two element square-patch microstrip antenna was designed, and tested. The antenna showed a broad beam with an approximation cardiod shape where the two elements were separated by $\lambda/2$ (λ is the wave length) and two elements were fed by units of equal magnitude and phase by π. The antenna array thus appears promising for the handheld unit.

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MOM Method of Moment

FDTD Finite Difference Time Domain

VSWR Voltage Standing Wave Ratio

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Dedication

To My Dear Mother

Ranjanie

To My Dear Brother

Kelum

To My Dear Teachers

Prof. G.T. F. De Silva & Prof.(Ms.) I.J. Dayawansa

and

To My Beloved Husband

Namal