

DESIGN OF A MOBILE PHONE ANTENNA TO REDUCE HEALTH RISKS

MASTER OF SCIENCE



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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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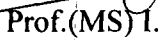
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(Supervisor)

Abstract

Mobile phones use Monopole antennas for communication. They have an omnidirectional 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 cardioid 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.

	Page No.
Declaration	II
Abstract	III
CONTENTS	IV
Acknowledgement	XI
Dedication	XII
1.0 Introduction	01
1.1 Literature Survey	02
1.2 Specific Absorption Rate (SAR)	04
1.2.1 Safety Standards for EM absorption	05
1.3 Present work	06
2.0 Numerical Techniques for health hazard	08
2.1 Method of Moments (MOM)	08
2.1.1 Transformation to Matrix Equation	12
2.1.2 Matrix equation for MOM	12
2.2 Finite Difference Time Domain (FDTD)	15
2.2.1 Method of Analysis	16
2.2.2 Numerical models of the Head	16
2.2.3 Calculation of the SAR	17
2.2.4 A. FDTD method considering Elastic Waves	17
2.2.5 Thermoelastic Waves for the Exact SAR distribution	17
2.2.6 B. FDTD method considering Electromagnetic and Magnetic fields	19
2.2.7 FDTD results	19
2.3 Comparison between MOM and FDTD	20

	Page No.
3.0 Antenna Design	22
3.1 Cellular phone Antenna	22
3.2 Microstrip patch antenna feeding methods	22
3.2.1 Coaxial Feed	22
3.2.2 Transmission Line Feed	23
3.3 Microstrip antenna design	24
3.3.1 Far field	27
3.3.2 Antenna structure	28
3.3.3 Effect of metallic sidewalls	28
3.3.4 Calculations for Antenna design	28
3.3.5 Radiation Pattern measurements	28
3.3.6 Gain measurements	29
4.0 Observations	
4.1 Dimensions of the Microstrip Single Patch Antenna	32
4.2 Radiation patterns	
Single patch antenna	33
4.3 Dimensions of the two element Microstrip Patch Antenna Array	34
4.4 Radiation patterns	
4.4.1 $\delta=\pi$, $d=\lambda/2$ (phase difference π and distance between two patches is $\lambda/2$)	35
4.4.2 $\delta=\pi$, $d=\lambda$ (phase difference π and distance between two patches is λ)	36
4.4.3 $\delta=\pi$, $d=\lambda$ (phase difference π and distance between two patches is λ)	37
4.4.4 $\delta=0$, $d=\lambda$ (phase difference π and distance between two patches is λ)	38
4.4.5 $\delta=\pi$, $d=\lambda/2$ (phase difference π and distance between two patches is $\lambda/2$) with metallic side walls	39
5.0 Conclusion and Discussion	40



6.0 References	43
7. 0 Appendices	46
Appendix (A)_ Cellular environment	46
Appendix (B)_ BRAIN2()	49
Appendix (C)_ SKTIS()	52
Appendix (D)_ SKTIS1()	55
Appendix (E)_ GREEN()	57
Appendix (F)_ GEOMETRY()	58
Appendix (G)_ MATERIAL()	59
Appendix (H)_ Using brain2.m Matlab program the graphical outputs	65
Appendix (I) _ Method of Moment	67
Appendix (J)_ FDTD method	70
Appendix K_ Magnetic field equations,Electric field equations, General FDTD algorithm,Modeling of electromagnetic interactions with biological tissue.	75
Appendix (L)_ Rectangular patch using Cavity model, The effect of the substrate Thickness	79
Appendix (M) _ Calculations	83
Appendix (N)_ fdtd6()	86
Appendix (O)_ fdtd7()	89
Appendix (P)_ fdtd8()	93
Appendix (Q)_ prog()	94
Appendix(R)_ impedance()	94
Appendix (S)_ array2()	95
Appendix (T)_ array3()	96
Appendix (U) _ 'MOBILE PHONE GAVE ME CANCER', SAYS DOCTOR	97
Appendix (V)_ Cellular system used in Sri Lanka, Power of Mobile Phone for AMPS	98

List of Figures	Page No.
Figure 1.1.1 : Schematics Model of a Mobile Telephone system	03
Figure 2.1.1 :Block model representation for the human head and cellular phone	09
Figure 2.1.2: EM radiation exposed to the body	10
Figure 2.1.3: Dimensions of the (i) brain, (ii) Brain and Skull, (iii)Brain, Skull and Ear	13
Figure 2.1.4: SAR distribution in a brain along the three cartesians coordinates at 1mW/cm2 of incident power density (using MOM)	14
Figure2.2.1: Pressure waveform of the FDTD result at the center of the brain with the SAR distribution	18
Figure 2.2.2: SAR distribution in a brain along the three cartesians coordinates at 1mW/cm2 of incident power density (using FDTD)	18
Figure 3.2.1: Rectangular microstrip patch antenna with coaxial line feed	23
Figure 3.2.2: Rectangular patch antenna with microstrip line feed	24
Figure 3.3.1: Single patch antenna	26
Figure 3.3.2 : Two element antennas with different orientations different phase angles of feeding and different separations	26
Figure 3.3.3 : Patch antenna surrounded by metallic side walls	26
Figure 3.3.4: Setup for radiation field measurements	29
Figure 3.3.5:Block of diagram of the experimental setup for measure the gain of the patch antenna. Rx-microstrip antenna, Tx- Horn antenna	29
Figure 3.3.6:Block of diagram of the experimental setup for measure the gain of the patch antenna. Rx-horn antenna, Tx- Horn antenna	30
Figure 3.3.7: Block diagram to measure the losses for cables and transitions.	30

Figure 3.3.8: Block diagram to obtain the direct measurements	30
Figure 4.1.1: Dimensions of the single patch antenna	32
Figure 4.2.1: Theoretical and experimental radiation pattern for the single patch Antenna	33
Figure 4.3.1: Dimensions of the double patches antenna	34
Figure 4.4.1: Theoretical and experimental radiation pattern for the double patches antenna at phase difference π and $\lambda/2$ distance between two patches.	35
Figure 4.4.2: Theoretical and experimental radiation pattern for the double patches antenna at phase difference π and λ distance between two patches.	36
Figure 4.4.3: Theoretical and experimental radiation pattern for the double patches Antenna at phase difference π and λ distance between two patches.	37
Figure 4.4.4: Theoretical and experimental radiation pattern for the double patches antenna at phase difference 0 and λ distance between two patches.	38
Figure 4.4.5: Experimental radiation pattern for the double patches antenna at phase difference π and $\lambda/2$ distance between two patches with metallic side walls	39
Figure 5.1: Required radiation pattern for the antenna	41
Figure 5.2: Radiation pattern for the monopole antenna & microstrip antenna	42

List of Tables

Table 1.2.1: SAR limit for the exposure of the general public in British Standards.	05
Table 2.1.1: Results of the MOM when EM waves is exposed directly to the brain tissues, skull with brain tissues and finally consider skull, brain tissues and ear as tissue.	15
Table 2.2.1: Results of the FDTD when EM waves is exposed directly to the brain tissues, skull with brain tissues and finally consider skull, brain tissues and ear as tissue.	19
Table 2.3.1: Comparison among the results obtained earlier and latest	20
Tabel 3.3.1: Patch length and patch width for each frequency and permittivity	25



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List of Abbreviations

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



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To My Dear Teachers

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

and

To My Beloved Husband

Namal