A METHOD FOR ESTIMATION OF COMPLEX PERMITTIVITIES OF 3-D INHOMOGENEOUS BIOLOGICAL BODIES

(SOFTWARE DEVELOPMENT)

Thesis is presented in partial fulfilment for the award of the Bachelor in Electrical Engineering (Honours) of
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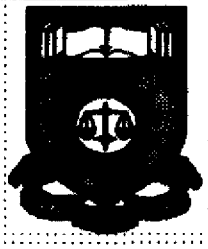

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ABSTRACT

Complex permittivities are estimated for a 36-cells model which represent the chest portion of the block model of man by using moment method formulation of the electric field integral equation.. The saline/ water can be used as a surrounding medium to get a lower error in calculated complex permittivities as compared to the air, on account of batter matching of energy to the biological body. The inverse problem can solved for a small number of buried cells but become illposed and unsolved for large number of buried cells.

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CHAPTER 1

1.0 INTRODUCTION

Estimation of complex permitivities of a biological body in vivo may be useful for many biomedical applications. Electromagnetic imaging , if feasible would be advantageous as compare to X-rays, use of radioactive isotopes, etc., on account of relative safety of nonionizing radiation. Knowledge of the spatial distribution of complex permitivities (ε*s) would be useful in individuallizing the electromagnetic hyperthermia regimen for cancer therapy. Electromagnetic imaging is of interest for broder nonbiomedical application as well, e.g., for nondestructive testing, geophysical exploration, etc.

In X-ray imaging technique, the propagation beam is well-collimated and therefore easy to manipulate but the scattering and diffraction of electromagnetic waves for inhomogeneous bodies is very complicated.Some examples are a layer medium[10], a perfectly conducting cylinder[11] and a lossless dielectric cylinder[12].These can be simulate using the moment-method solution of the electric field integral equation (EFIE).

In the previous paper[1] we have developed an algorithm for estimation of $\varepsilon * s$ of a N-cell body from the knowledge of scattered electric field ($\vec{E}^{s}$) at N receiver locations, incident electric fields at N-cell centroid location ($\vec{E}^{i}$), cell sizes, cell