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ABSORPTION RATE ANALYSIS OF IMPLANTABLE AND ON-BODY MATCHED ANTENNAS' RADIATION ON THE HUMAN BODY

*Akib Jayed Islam
Department of Electrical and Electronic Engineering (EEE),
Port City International University, Chattogram, Bangladesh

ABSTRACT

Specific Absorption Rate (SAR) is an unavoidable parameter to be deliberated for different RF (Radio Frequency) dosimetry assessments in the area of biotelemetry. There is much apprehension in presentation contemplates as they significantly affect the medical problems in the ongoing global community. SAR computes the assimilation of electromagnetic radiation of RF from gadgets in an exposure zone. The consequence of the SAR parameter has been stirred in wide-ranging areas of innovation and even contemplated in the modern design of radiation patterns from biotelemetry gadgets, for example, MRI (Magnetic Resonance Imaging) to likewise ubiquitous cell phones. Specialists have explained the consistent connection of electromagnetic field associations with organic frameworks. The developments in technology represent a grave worry about the effect on human wellbeing. In this paper the exhibited research work dissects the impacts of electromagnetic (EM) radiation of implantable inside human body and on-body matched antenna on human body. The EM radiation is estimated dependent on SAR. The radiation assimilation dissected through simulations by applying different frequency band utilizing CST Studio Suite software. SAR was measured for different positions of the antennas. This calculation validates SAR is high for tiny sized antenna; effectively the value of SAR reduces when the antennas' size increase.

Key words: Implantable Antenna, On-body Matched, Human Phantom Model, Radiation Pattern, Specific Absorption Rate (SAR)

INTRODUCTION

In recent times with the development of microwave and RF technology, miniaturization design of the antenna along with the simplified design of the circuitry without compromising the performance have become prominent in the antenna and propagation field. Microwave filters and antennas have been introduced in the integrated circuit because of their noteworthy availability in wireless communication and biomedical devices. Biotelemetry applications require wearable antennas which are categorized into three-mode such as on-body matched, off-body and in-body interface (Chakraborty *et al.*, 2018 and Farhad *et al.*, 2018). The antenna embedded with human tissue which influences the performance of the antenna is called in-body or implantable antenna. The antenna which operates on the surface of the human body and develops a communication with the biomedical devices is recognized as on-body matched antenna which needs higher directivity (Kim *et al.*, 2016).

SAR is one of the significant parameters for safety apprehensions to human exposure examination. SAR is a procedure of a comprehensive analysis and deliberated as one of the inventive regions of research in exposure experiments. SAR estimates the rate of the quantity of ingestion of energy when there is a presentation of the human tissue to the RF signals. It signifies the power absorbs by the human tissue. SAR study is a domain that dictates an exposure area and a source. The source is normally a transmitting structure coordinated towards a vital part of a human tissue that is immobilized against extreme natural impacts of steady exposure. Researchers follow basic structures to investigate the radiation pattern. Literatures (Christopoulou *et al.*, 2009 and Koulouridis *et al.*, 2004) presented

**Corresponding Author:* Akib Jayed Islam; *akibjayedislam@gmail.com*