

運用 FDTD 法於植入式生醫裝置之 RF 傳輸模擬

黃曼菁^a、鄭凱元^{b*}、陳政煌^c、李宗翰^d

^a 臺北醫學大學附設醫院眼科主治醫師

^b 淡江大學機械與機電工程學系研究生

^c 淡江大學機械與機電工程學系碩士

^d 淡江大學機械與機電工程研究所所長

*通訊作者: 作者B, 696371201@s96.tku.edu.twt

摘要

植入式生醫裝置在現代醫學中已獲得了廣泛的應用。將微型低功耗的生醫裝置植入人體內，對各種生理訊進行檢測，或對器官、組織進行控制，更可作為植入式藥物釋放系統。由於裝置不需通過皮膚或腸胃，各種干擾因素也大為減少，保證了與人體間良好的匹配性，並具有使用方便、舒適等優點。

近年來，無線射頻技術運用在植入式生醫裝置的研發有所突破，控制和回饋的參數、以及用於診斷和治療的資訊也增加很多，這些長足的進展拓寬了植入式生醫裝置應用發展的領域。本研究中探討以無線射頻技術作為植入式生醫元件及裝置所需之能量及資料傳輸的方式，使用以 FDTD 法所建構之人體電磁場模型，來模擬植入式生醫裝置傳輸射頻能量時，體內外的 SAR 值分佈，用於評估植入式生醫裝置在不同設定下之能量傳輸效率。

關鍵字：植入式生醫裝置、時域有限插分法、無線射頻傳輸。

Abstract

The implantable bio-medical device has been broadly applied in modern medical science. Implanting the microscopy, low energy consumption devices which can release medicine automatically into human body and get all kinds of physiology information to control organs and tissues. Because this device does not necessary pass through skin and stomach, then several disturbance factors are reduced. Therefore, this device has not only well matching but also a lot of advantages, included convenient usage and comfort, the major function is adjusting quantity of medicine real time to restrain disease and recover faculty of organs.

In recent years, the improvements of micro electro mechanical design and manufacturing technology promote development of implanted. These technologies microminiaturized the bio-medical element. This paper studied on methods of data transmission on implantable bio-medical element by RF technology. This paper utilize human tissue distribution image by use FDTD method, which can simulate transmission energy of RF and SAR distribution inward and outward parts. Moreover, this method could estimate energy transmission efficiency in different conditions

Keywords: *implantable biomedical devices, FDTD method, wireless radio frequency technology*