

Analysis and modeling of medical electronic devices using three-dimensional simulations

Emphasis on cochlear implants and insulin pens

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ABSTRACT

The recent advances in MedTech have seen an interest for accurate modeling and high-precision simulations in order to characterize and predict the behaviour of medical devices employed in various applications. The presentation will focus on the analysis of modeling using three-dimensional simulations of medical electronic devices such as cochlear implants and insulin pens. To this purpose ANSYS simulator has been used in HFSS and Maxwell 3D modules respectively. Firstly, to characterize the antennas in cochlear implants a multi-tissue model has been prepared and high-frequency analysis has been performed providing amongst other radiation patterns, Smith charts and contour plots of the total radiated field. Secondly, a three-dimensional model for the capacitive measurement in an insulin pen used by diabetic persons has been studied, where a fully parametrized model allowing for capacitance evaluation has been proposed. In the latter case, a multi-electrode configuration for a real-life insulin pen has been investigated.

BIO

Dr. Maria-Alexandra Paun is researcher at EPFL-Switzerland, she works in the development of electronics for medical devices (MedTech). She is currently Chair of IEEE Switzerland Section, Chair of IEEE Women in Engineering (WIE) Affinity Group in Switzerland and Corresponding Member in the IEEE R8 WIE Subcommittee.

Dr. Maria-Alexandra Paun received the Engineer Diploma in 2008 from Politehnica University of Bucharest, Romania. During 2008-2009, she was postgraduate researcher at University of Kent, UK. She received her PhD degree in June 2013 on the subject of Hall Effect sensors at EPFL. During 2013-2015, Maria-Alexandra was Visiting Researcher at University of Cambridge, UK.

