Instituto Universitario de Investigación de Matemáticas y Aplicaciones Universidad Zaragoza

Departamento de Matemática Aplicada Universidad Zaragoza

Conferencia

por

Luis Enrique Bergues Cabrales

Centro Nacional de Electromagnetismo Aplicado
Universidad de Oriente, Santiago de Cuba

título

"Integrated analysis of the potential, electric field, temperature, pH and tissue damage generated by different electrode arrays in a tumor under electrochemical treatment"

Abstract
The Electrochemical treatment can be used for local control of solid tumors in both preclinical and clinical studies. In this paper, an integrated analysis of the spatial distributions of the electric potential, electric field, temperature and pH together with the acidic and basic areas are computed, via Finite Element Methods, to improve the geometrical description of electrode arrays for a better electrochemical treatment. These physical quantities are generated by different polarization modes and shapes of electrode arrays. Additionally, the equations over a rectangular two-dimensional domain, which represents the tumor tissue, are solved. The results demonstrate how the electric potential, electric field, temperature and pH distributions depend strongly on the electrode array. Furthermore, significant pH changes and temperature increments are shown after 60 min of treatment. The numerical results agree with the analytical ones reported in the literature. It is concluded that the numerical solution method permits to make an integral analysis, prediction and rapid visualization of the most important electrochemical variables that take place in tumor destruction, thus, providing the possibility of a more effective therapeutic planning before electrochemical treatment is conducted.

Fecha: Jueves, 22 de noviembre de 2018
Hora: 12:00 horas
Lugar: Aula 13, Edificio de Matemáticas, 1ª planta