

MULTIPLE TRACES FORMULATION FOR MULTIPLE BIOLOGICAL CELLS ELECTRICALLY EXCITED

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ABSTRACT. Several medical and biological applications require the excitation of cells by means of electrical signals. The modeling of such represents a rich field to try and improve multi-physics numerical methods. Nonetheless, boundary integral based ones are seldom used despite their ability to deal with multiple structures and large scales. In this work, we implement a numerical algorithm based on the Multiple Traces Formulation of the first kind to model the electrostatic interaction among multiple cells. Discretization is provided by means of Fourier series and matrix entries are computed either analytically or via Fast Fourier transform on canonical domains with significant savings in computational work. Numerical results support our claims and time-domain extensions are discussed.

Keywords: Multiple Traces formulation, Multiple scattering, electrical stimulation of biological tissue.

Mathematics Subject Classifications (2010): 35Q92, 46N60, 62P10, 92C50

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