

NON-INVASIVE CARDIAC DIAGNOSIS METHOD BASED ON THE SIMULATION OF ELECTRICAL FIELD GENERATED BY MYOCARDIUM

Alina Czerwińska, Marek Doros, Krystyna Kolebska

Abstract

In the article there has been presented the non-invasive method of cardiac diagnostics where the computer simulation of electrical field generated by the heart muscle of examined patient is being applied. For the simulated field there has been formulated the inverse Cauchy problem; the solutions of this problem are the distributions of epicardial potentials. The basic information about the cardiac electrical activity of the examined patient are measured in non-invasive way the maps of surface potentials. They constitute the boundary condition in the solved inverse problem, where the finite elements method (FEM) with non-linear regularization has been applied. In the article there has been described the procedure of the construction of the discrete geometrical-conductivity model of thorax of examined patient. There also has been presented the algorithm of calculation of epicardial maps. There have been calculated and presented in the respective figures the following maps: epicardial potentials, laplacian of potentials and epicardial isochrones. The usefulness of the elaborated method in the diagnosis of ischemia and dysrhythmia as well as in the investigations on the results of drug treatment in cardiac prophylactics has been emphasized.

Keywords: non-invasive diagnosis, simulation of cardiac field, inverse problem