MODELING AND MEASUREMENT SYSTEM FOR MAGNETIC FIELD DISTRIBUTIONS IN BIOLOGICAL STRUCTURES

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Abstract- In this paper we develop a system for modeling and measurement of magnetic field distributions in biological structures caused by the externally applied electromagnetic field. We describe an effective and versatile approach for three-dimensional reconstruction of the field distributions from two-dimensional visualization the measured magnetic field data. The finite element model for magnetic field calculation is built. The magnetic fields of very thin slices of the 3D object are determined and visualized. Using these 2D images as slices of 3D image and based on the field theory and image processing techniques we developed a reconstruction approach for 3D visualization of magnetic field. This approach combines new technologies of 3D visualizations and characterizes with flexibility, simplicity and portability. The proposed approach was successfully applied for 3D reconstruction and visualization of magnetic field and current distributions in biological structures. The virtual microscope is developed for investigations of magnetic field distributions in biological structures during magnetic stimulation. *Anisotropic Magneto-Resistive (AMR) sensors are applied for magnetic field measurements. AMR sensors are combined in array probes in order to increase productivity of measurement process and improving the performance of probes.*

Index terms: Magnetic field modeling, Finite element method, Image reconstruction, Magnetic field, Visualization., AMR sensors array, Magnetic field measurement.