

Electrical impedance tomography of soft tissue: Forward and inverse modelling

The diploma thesis builds the necessary apparatus to formulate and solve the inverse problem of Electrical Impedance Tomography (EIT), including strategies to remedy the ill-conditioning of the problem. The problem itself lies in determining the structure of a body of interest by driving a set of electrical currents through electrodes connected to its surface. The aim of the thesis is to investigate possible utility of this method in medical applications, namely scanning for malignancies in the female breast, by studying the interaction of tissue with the electromagnetic field and by preparing a set of corresponding numerical experiments. An approximate characterization of the method's sensitivity with respect to noise is derived based on the most basic set of such numerical experiments, which were prepared by a complete software solution called prs4D developed by the author and his advisor, while some aspects of its implementation are included in the thesis.