

NUMERICAL ANALYSIS AND SCIENTIFIC COMPUTING
SEMINAR

New methods in EEG/MEG source analysis

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Abstract: Electro- and magnetoencephalography (EEG and MEG) have become important tools for non-invasive functional neuroimaging due to their unique time resolution. In many applications of EEG/MEG, the goal is to reconstruct the sources inside the brain volume that evoke the measured signal, which leads to a related ill-posed inverse problem (EEG/MEG inverse problem). To solve this inverse problem accurately, it is necessary to precisely simulate the electric/magnetic field caused by a point-like source inside the brain volume: the so-called forward problem of EEG/MEG. When aiming to take the individual head shape and conductivity distribution of the subjects head into account, the EEG/MEG forward problem has to be solved numerically, e.g., using finite element methods (FEM). In this talk, we present examples showing how the use of novel mathematical methods can increase the accuracy of and help to better understand the uncertainties inherent to EEG/MEG forward solutions. We further analyze the influence of these uncertainties on EEG/MEG inverse solutions.

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