ASSESSMENT OF TWO APPROXIMATION METHODS FOR THE INVERSE PROBLEM OF ELECTROENCEPHALOGRAPHY

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Abstract. The goal of this work is to compare two computational models for the inverse problem of electroencephalography: the localization of brain activity from measurements of the electric potential on the surface of the head. The source current is modeled as a dipole whose localization and polarization has to be determined. Two methods are considered for solving the corresponding forward problems: the so called *subtraction approach* and *direct approach*. The former is based on subtracting a fundamental solution, which has the same singular character of the actual solution, and solving computationally the resulting non-singular problem. Instead, the latter consists in solving directly the problem with singular data by means of an adaptive process based on an a posteriori error estimator, which allows creating meshes appropriately refined around the singularity. A set of experimental tests for both, the forward and the inverse problems, are reported. The main conclusion of these tests is that the direct approach combined with adaptivity is preferable when the localization of the dipole is close to an interface between brain tissues with different conductivities.

References

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