

A MATLAB FE Library for the Simulation and Inversion of EM Problems

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SUMMARY

The electromagnetics working group of the Freiberg Institute of Geophysics and Geoinformatics looks back on a long history of research in the field of simulation and inversion of electromagnetic problems. Together with the Faculties of Mathematics of the Universities of Chemnitz and Freiberg, a wide variety of individual software solutions have been developed over the years. A collaborative software project over the last three to four years has enabled the pooling, unification, and re-implementation of all the acquired knowledge into a single Matlab finite element software library, which is currently being tested and is on its way to becoming an open source application for the EM community. In our poster, we present the key features of this library which allow for the implementation of the forward and inverse problem of any type of time- or frequency dependent geophysical electromagnetic application in 2D and 3D. For this purpose, case studies for magnetotellurics (MT) and geoelectrics (DC) as well as examples for controlled source electromagnetics (CSEM) and induced polarization (IP) are shown. We would like to invite all interested parties to discuss with us possible applications as well as technical or theoretical aspects of electromagnetics and its numerical implementation.

Keywords: Finite elements, unstructured grids, simulation, inversion, Matlab, library
