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Multiscale Modeling of Geophysical Electromagnetic Fields in Highly Heterogeneous Media

In this work, we present two multiscale methods with and without oversampling. These methods simulate quasi-static electromagnetic responses in the frequency domain. They lead to a significant reduction in the size of the final system of equations and the computational time. For showing the performance of these methods, we construct a synthetic 3D geophysical setting of a mineral deposit from inversion results of field measurements over the Canadian Lalor mine. The setting includes highly heterogeneous conductive media, features varying at several spatial scales and it is discretized using OcTree meshes.

This work is done in collaboration with Prof. Eldad Haber (UBC), Dr. Christoph Schwarzbach (Computational Geosciences, Inc), and Dr. Wenke Wilhelms (UBC).