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A Multiscale Finite Volume with Oversampling Method to simulate Low-frequency Electromagnetic geophysical responses

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In Geophysics, simulation of low-frequency Electromagnetic (EM) fields in highly heterogeneous, anisotropic media is computationally very expensive. One reason being the multiple length scales that coexist in a given realistic setting. Discrete models require very fine meshes leading to solve large linear systems of equations. In this work, we develop a multiscale finite volume method with oversampling for the quasi-static Maxwell's equations in the frequency domain. This method reduces the size of the system of equations to be solved while retaining a good level of accuracy in the solution. The performance of our method is shown in the context of an EM geophysical application.