GENERALIZED MULTISCALE FINITE ELEMENT METHOD FOR HELMHOLTZ PROBLEM IN HETEROGENEOUS MEDIA

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In this work, we consider wave propagation in heterogeneous media. The mathematical model is described by Helmholtz problem related to wave propagation with absorbed boundary condition. Solutions for Helmholtz equations are required in many areas of applied mathematics, including fluids mechanics, vibration, seismic and acoustics. Conventional numerical methods, such as finite difference and finite element methods, suffer from the need of extremely dense spatial discretization and fine-grid resolution with heterogeneity leads to the large system. Therefore, we construct a coarse grid approximation for effective solution using Generalized Multiscale Finite Element Method (GMsFEM). In this method, we construct a multiscale space using solution of the local spectral problems in each coarse elements. The results of the numerical solution for the two-dimensional problem are presented for two model problems: seismic wave propagation in fractured media and heterogeneous media.