

ABSTRACT

The Helmholtz problem is hard to solve in heterogeneous media, in particular, when the wave number is real and large. The problem is neither coercive nor Hermitian symmetric. The article is concerned with the V -cycle multigrid (MG) method for high-frequency solutions of the Helmholtz problem. Since we need to choose at least 10-12 grid points per wavelength for the solution stability, the coarse grid problem is still huge and occupies most of the computation time. To solve the coarse grid problem efficiently, a nonoverlapping domain decomposition method is adopted without introducing another coarser subspace correction. Various numerical experiments have shown that the resulting MG method converges, independently on the grid size and the wave number, when the number of smoothing iterations is not too large and the coarse grid solution captures characteristics of the physical problem.