Parallel solvers for Helmholtz problems

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Abstract

The ability to rapidly compute solutions to Helmholtz problems is important across many disciplines of science and engineering. However, due to the oscillatory nature of solutions and the pollution effect that arises in discretization of wave problems, the discretized linear systems can be tremendously large, especially in the mid- and high-frequency regime. The non-coercivity present degrades the performance of many classical iterative methods that have obtained great success in solving elliptic problems. Hence, the development of efficient iterative solvers for wave problems remains a very active area of research. In this minisymposium, recent advances on fast solvers for Helmholtz problems and the related convergence theory will be presented. A particular focus will be put on parallel sweeping methods, finding efficient transmission conditions for domain decomposition approaches, and complex shifted Laplace preconditioners.

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