

(IP) Preconditioning high frequency wave equations

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The numerical solution of high frequency wave propagation has been a longstanding challenge in computational science and engineering. This talk discusses some recent developments in designing efficient preconditioners for time-harmonic wave equations. We consider a sequence of examples with important applications, and for each we construct an efficient preconditioner (approximate inverse) that allows one to solve the system with a small number of iterations. From these examples emerges a new framework, where sparsity, geometry of wave phenomenon, and highly accurate discretizations are combined together to address this challenging topic.

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