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Application of multigrid to indefinite Helmholtz equation

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Helmholtz equation is a widely used model for many phenomena involving wave propagation. Finding solutions to these equations is often nontrivial especially for the ones with high wave numbers. For multigrid, for example, the main bottleneck is a richness of the near kernel of the Helmholtz operator. One of the ways to deal with such richness is to use multiple descriptions of solution on each coarse enough grid. In this talk, we discuss new results for the two-dimensional Helmholtz equation, obtained by utilizing some (relatively) old ideas.