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**Smoothed Aggregation Multigrid for One-Dimensional
Helmholtz Problems**

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We present a purely algebraic smoothed aggregation (SA) multigrid method for one-dimensional scalar Helmholtz problems with exterior radiation boundary conditions. The scalar Helmholtz problem is particularly difficult for algebraic multigrid (AMG) solvers. Not only can the discrete operator be indefinite and non-self-adjoint, but it also allows for oscillatory error components that yield relatively small residuals. These oscillatory error components are not effectively handled by either standard relaxation or standard coarsening procedures. We address these difficulties through modifications of the SA method and by providing the setup phase with appropriate wave-like near-nullspace candidates. Our results for GMRES preconditioned with the proposed SA method exhibit near grid-independent performance, along with consistent performance across a wide range of frequencies.