

# Multigrid Reduction for Coupled Linear Systems with Applications to Multiphase Flow

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Linear systems with multiple physical variables pose a challenge for standard multigrid techniques, particularly when the coupling between the variables is strong. We present our efforts to develop a multigrid-preconditioned Krylov solver for coupled and nonsymmetric systems of linear equations. The preconditioner is designed to represent the coupling between the physical variables and account for the underlying physics of the system. We present performance results for the solver on challenging flow and transport applications.

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