

AMG+: Extended Multilevel Principles

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Abstract:

By employing new extended multilevel hierarchy construction principles, AMG can be applied to many new types of problems. The extended principles include general rules for choosing relaxation, constructing the coarse-level variables, the coarse-to-fine interpolation, and coarse-level equations, and a quantitative performance predictor of the multi-level cycle convergence rate, called the mock cycle.

As an illustrative example, a fast solver for the highly indefinite 1D Helmholtz equation is developed.