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Reducing Communication in Algebraic Multigrid using Additive Variants

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Algebraic multigrid (AMG) has proven to be an effective scalable solver on many high performance computers, however its increasing communication complexity on coarser levels has shown to seriously impact its performance on computers with high communication cost. Additive AMG variants provide increased parallelism as well as decreased numbers of messages per cycle, but can also lead to decreased convergence. We present an additive variant which guarantees the same convergence rate as multiplicative algebraic multigrid and investigate its potential for decreased communication as well as improved efficiency on emerging architectures.