
Tobias Jones
Algebraic Multilevel Domain and Range Decomposition
(aMLDD/aMLRD)

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In modern large-scale supercomputing applications, Algebraic Multigrid (AMG) is a leading choice for solving linear systems. However, on the newest architectures, the relatively high cost of communications versus computations is a concern for the scalability of traditional implementations. A new algorithm is introduced that replaces the traditional iterative cycle with global domain decomposition cycles. Algebraic Multi-Level Domain Decomposition (aMLDD) and Algebraic Multi Level Range Decomposition (aMLRD) trade communication for computation by forming composite grids that replace many stages of multilevel communication with local computation using redundant information. While these methods achieve the goal of trading communication for computation the method is not a marked improvement over traditional AMG scaling results for current architectures.