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Parallel algebraic multigrid for systems of PDEs

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Algebraic multigrid (AMG) methods are popular for solving large sparse linear systems, particularly those resulting from the discretization of a scalar elliptic PDE. When solving linear systems derived from systems of PDEs involving multiple unknowns, modifications to classical AMG are typically required. In particular, two accepted approaches are treating variables corresponding to the same unknown separately (the "unknown" approach) and treating variables corresponding to the same physical node together (the "nodal" approach). We discuss the applicability and parallel performance of these two approaches as well that of a "hybrid" approach that combines aspects of each. In addition, because we are interested in the efficient parallel solution of large systems of PDEs arising from elasticity applications, we also discuss improving interpolation of the rigid body modes.