Algebraic Multigrid (AMG) - Beyond the M-Matrix Case

M. Griebel[1], B. Metsch[2], and M. A. Schweitzer[3]

Abstract: Multigrid Methods are known to be optimal solvers for large linear systems arising from the finite element, finite difference of finite volume discretization of a partial differential equation (PDE). Algebraic multigrid methods (AMG) extend this approach to a wide class of problems, e.g. anisotropic operators or unstructured grids. However, the construction as well as the convergence analysis of classical AMG methods is based on the assumption that the linear system matrix is a symmetric positive definite M-matrix. In this talk we present an approach to extend the applicability of AMG to a wider class of problems. In particular, we focus on the construction of interpolation operators that approximate the near-kernel components of the operator adequately. In consequence, we obtain an efficient coarse-grid correction.

[1,2,3] Institut für Numerische Simulation, Universität Bonn
Wegelerstraße 6, 53115 Bonn, Germany
{_griebel, metsch, schweitzer_} _@ins.uni-bonn.de_