

Nonlinear FETI-DP and BDDC Domain Decomposition Methods

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For a few decades already, Newton-Krylov algorithms with suitable preconditioners such as domain decomposition (DD) or multigrid (MG) methods (Newton-Krylov-DD or Newton-Krylov-MG) have been the workhorse for the parallel solution of nonlinear implicit problems. In these methods the nonlinear problem is first linearized and then decomposed. By changing the order of these operations, new algorithms with increased locality and reduced communication are obtained. Several of these algorithms will be discussed and computational results combining nonlinear domain decomposition with multigrid methods on several hundred thousand BG/Q cores will be shown.

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