Nonlinear Domain Decomposition Methods

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Abstract

Traditionally, the nonlinear systems arising from the discretization of nonlinear partial differential equations are solved by variants of Newton's method. Often, a Newton-Krylov approach in combination with suitable preconditioners (multigrid, domain decomposition) is used. If necessary, globalization techniques, e.g., trust region, line search, load stepping, etc. are applied additionally.

Domain decomposition-based nonlinear preconditioning is an alternative approach to improve the robustness and convergence properties of nonlinear solvers. These methods also have a great potential to increase parallel scalability and to decrease time to solution. Different one- or two-level approaches, including nonlinear Schwarz methods (ASPIN, RASPEN), field-split approaches, and nonlinear FETI-DP/ BDDC methods, are considered.

List of Speakers

1. David Keyes, King Abdullah University of Science and Technology (KAUST), Saudi Arabia

2. Rolf Krause, Università della Svizzera italaliana, Switzerland

3. Alexander Heinlein, TU Delft, The Netherlands

4. Martin Lanser, University of Cologne, Germany