Block Preconditioning for Challenging  
Multiphysics Systems

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ABSTRACT

Large sparse blocked linear systems frequently arise from the discretization and linearization of multiphysics systems. These blocked linear systems of equations are often ill-conditioned but solving the system in a robust, efficient, and scalable manner is crucial in many engineering and scientific applications. The use of physics-informed approximate block factorization preconditioners has shown to be an effective approach.

This minisymposium addresses the most important and active research topics for block preconditioning for challenging multiphysics systems, including

* physics-based block preconditioning
* multi-level preconditioners
* approximate block factorizations
* preconditioned iterative solvers for multiphysics systems
* the interplay of physics, algorithms, implementation, and hardware aspects

with applications in various fields in computational mechanics, e.g. in solid mechanics, contact and fracture problems, surface-coupled problems such as fluid-structure interaction or volume-coupled problems such as reactive flows, magneto-hydrodynamics, or plasma physics applications, among others.

The purpose of this session is to bring together researchers working on block preconditioning methods for large sparse linear systems of equations arising from challenging multiphysics problems.