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A Superposition-Based Parallel Discrete Operator Splitting Technique for Incompressible Flows KENN ZHANG, University of Illinois at Chicago — Juxtaposition-based domain decomposition parallelization dominates in numeric computing. However, it suffers from complicated pre-processing and is restricted to field problems. In contrast, superposition-based parallelization shows great flexibility in partition of computational domains and follows the same numerical process as its serial counterpart, which makes code development and debugging much easier. In the other scenario, solving large scale indefinite systems continues to pose as a challenging issue. Many techniques exist but favors go to three categories of splitting methods, the continuous splitting, the semi-discrete splitting, and the discrete splitting. The underpinning idea of the proposed Discrete Operator Splitting (DOS) technique is to fully exploit the relation between the splitting and iterations. With the above two aspects combined, we present the superposition-based parallel discrete operator splitting finite element method and apply it to investigate incompressible Navier-Stokes flows. Finally, numerical examples are presented to demonstrate the success of the method.

Kenn Zhang
University of Illinois at Chicago

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