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Parallelization of efficiency-based adaptive local refinement for FOSLS-AMG

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A new adaptive local refinement strategy (ACE), in which the refinement decisions are based on optimizing the computational efficiency, has recently been developed. The first-order system least-squares (FOSLS) finite element methods, together with algebraic multigrid methods (AMG), complement this idea, resulting in a powerful tool for numerical solutions of many PDEs. However, in parallel environment, the global sorting of element local error indicators used by the original approach results in undesirable communication between processors. A strategy circumventing the global sorting is proposed. The test results show that the strategy has the potential of greatly reducing communication, while producing a sequence of refined grids with essentially the same quality as before.