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Communication-Avoiding Krylov Subspace Methods

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The exponential growth of communication costs relative to computation on modern computers motivates revisiting a previously dismissed set of algorithms: s-step Krylov subspace methods. One iteration of an s-step method has almost the same communication cost as one iteration of its related standard Krylov method, but accomplishes the same work as s of these iterations. We address concerns which hindered the earlier acceptance of these algorithms: performance, numerical stability, and preconditioning.