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**On improving linear solver performance: a block variant
of GMRES**

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Two approaches to improving the performance, i.e. time to solution, of an iterative linear solver algorithm are particularly viable. First, algorithmic changes that improve convergence properties result in faster convergence due to fewer overall floating-point operations. Second, modifications to an algorithm that reduce the movement of data through memory greatly impact performance because of the growing gap between CPU floating-point performance and memory access time. Ideally, a balance is achieved between improving the efficiency of an iterative linear solver from a memory-usage standpoint and maintaining favorable numerical properties. In this talk, we discuss the restarted generalized minimum residual (GMRES) method in the context of both approaches to improving performance. In particular, we present an alternative to the standard restarted GMRES algorithm for solving a single right-hand side linear system $Ax = b$ based on solving the block linear system $AX = B$. Additional starting vectors and right-hand sides are chosen to accelerate convergence.