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19122-6094. *MPGMRES: a generalized minimum residual method with multiple preconditioners.*

Standard Krylov subspace methods only allow the user to choose a single preconditioner, although in many situations there may be a number of possibilities. Here we describe an extension of GMRES that allows the use of more than one preconditioner. We make some theoretical observations, propose a practical algorithm, and present numerical results from problems in domain decomposition and PDE-constrained optimization. Our results illustrate the applicability and potential of the proposed approach. (Received September 23, 2012)