

Mixed precision GMRES-based iterative refinement with recycling

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Krylov subspace recycling is a well-known technique for reusing information across sequential invocations of a Krylov subspace method on systems with the same or a slowly changing coefficient matrix. In this talk, we present a mixed precision GMRES-based iterative refinement solver incorporated with Krylov subspace recycling approach. The insight in this algorithm is that in each refinement step, we call preconditioned GMRES on a linear system with the same coefficient matrix, with only the right-hand side changing. In this way, the GMRES solves in subsequent refinement steps can be accelerated by recycling information obtained from the first step. After giving a background on GMRES-based iterative refinement and Krylov subspace recycling, we present numerical experiments that show the advantage of combining this approach.

An enhanced model parameter estimation by a slow-fast decomposition based on the first order two time-scale expansion

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Some dynamical systems, e.g. biochemical networks, are characterized by more than one time scale. On the paradigmatic example of a drug-induced enzyme production we show how the slow-fast decomposition can serve for an enhanced parameter estimation when the slowly changing features are rigorously incorporated. The method has been developed to reduce confidence intervals for the estimated parameters. Our approach, based on the first order two time-scale expansion, is demonstrated on an in vivo model of xenobiotic metabolizing enzyme induction containing 8 reactions, 6 state variables and 15 parameters, as a case study.