Regularization by inexact Krylov methods

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This talk will present theoretical and algorithmic aspects of regularization methods based on inexact Krylov methods for the solution of large-scale discrete inverse problems. Specifically, we will introduce two new inexact Krylov methods that can be efficiently applied to unregularized or Tikhonov-regularized least squares problems, and we present their theoretical properties, including links with their exact counterparts and strategies to monitor the amount of inexactness. We then describe how the new methods can be applied to solve separable nonlinear inverse problems arising in blind deblurring, where both the sharp image and the parameters defining the blur are unknown. We show that the new inexact solvers (which can naturally handle varying inexact blurring parameters while solving the linear deblurring subproblems within a variable projection method) allow for a much reduced number of total iterations and substantial computational savings with respect to their exact counterparts. This talk is based on the work described in [1].

Joint work with M. Sabatè Landman.

References

[1] S. Gazzola and M. Sabaté Landman, *Regularization by inexact Krylov methods with applications to blind deblurring*, to appear in SIAM J. Matrix Anal. Appl. (2021). See also arXiv:2105.07378.