TRUNCATION AND RECYCLING FOR ITERATIVE HYBRID PROJECTION METHODS

J. M. Chung, **E. de Sturler**, and J. Jiang
Department of Mathematics, Virginia Tech
Blacksburg, Virginia, USA
sturler@vt.edu

Hybrid iterative algorithms can solve large linear discrete inverse problems very efficiently, as the regularization parameter can be determined dynamically during the iteration. This combines the efficiency of Krylov iterative methods with the opportunity of determining the optimal regularization parameter as the iteration proceeds. In this talk, we focus on methods based on Golub-Kahan Bidiagonalization (GKB). In contrast to the solution of standard least squares problems, where only a few vectors need to be stored in each iteration, hybrid algorithms must store all iteration vectors that span the Krylov space for the solution, since the regularization parameter is not known in advance. If the problem is very large, and convergence is not rapid, this may not be possible.

In this talk, we discuss truncation techniques that allow us to store only a modest number of vectors while using a hybrid projection approach and compute accurate solutions. In addition, this approach allows us to improve convergence by recycling selected subspaces for a sequence of linear inverse problems, from one problem to the next. We also provide convergence theory.