MISHA KILMER, Tufts University

Krylov Recycling for Sequences of Shifted Systems Arising in Image Reconstruction

Discrete image reconstruction or restoration problems are usually posed as (a sequence of) optimization problems. Due to either the nonlinearity of the forward model or due to the type of regularization used, a single cost function evaluation will often require the solution of a large-scale linear system with multiple complex identity or non-identity shifts, possibly also with multiple right-hand sides. Thus, in many image reconstruction and restoration problems, the single biggest computational bottleneck to image recovery is finding is the solution of a sequence of large-scale linear systems with complex identity or non-identity shifts. In this talk, we present new, computationally efficient Krylov recycling methods designed to significantly reduce the costs of solving such systems. We illustrate the advantage of using our methods in the context of specific image reconstruction and restoration applications.

This is joint work with Eric de Sturler (VA Tech) and Meghan O'Connell (Mathworks)