KRYLOV SOLVABILITY IN A PERTURBATIVE FRAMEWORK

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Solutions to abstract inverse linear problems $Af = g$ on Hilbert space $\mathcal{H}$ are often approximated by using finite linear combinations from the cyclic vector subspace generated by the operator A and datum g, also known as the *Krylov subspace* of A and g. These subspaces play an important role in applications: indeed, a Krylov-solvable inverse linear problem allows for the approximation of solution(s) by using very fast and well-known Krylov subspace methods.

This presentation is a first-round study of the phenomenon of Krylov-solvability of abstract inverse linear problems that are subject to small perturbations either in the operator A or the datum g. A particular focus is on monitoring phenomena related to the loss, gain, or preservation (i.e., the *stability*) of Krylov-solvability of inverse problems under perturbations. A meaningful way to describe the distance between Krylov subspaces that captures some of the most intuitive phenomena is also discussed. Throughout the presentation informative examples and results are given that unmask the complexity and range of phenomena encountered.

Though the presentation remains in the abstract, infinite-dimensional setting, perturbations of inverse linear problems are expected in applications for which one doesn't have precise information of the datum g and wishes to decide a-priori whether or not the problem is appropriately treatable using Krylov methods.

This is based on a series of joint works with Alessandro Michelangeli (Institute for Applied Mathematics, and Hausdorff Center for Mathematics, University of Bonn)

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