Inverse problem for ill-posed linear differential-algebraic equations with variable coefficients

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The talk describes a solution of the following inverse problem: given measurements y of some vector φ in the form $y = H\varphi + \eta$, to estimate φ, provided $L\varphi = f$, (f, η) are uncertain, that is $(f, \eta) \in G$ and G is a convex bounded closed set, L is a closed linear mapping in some Hilbert space, H is a bounded linear mapping. The estimation $\hat{\varphi}$ is chosen from the following minimax criterion: to minimize the worst-case error $\sup_{f,\eta}\{\|\varphi - \hat{\varphi}\|^2, L\varphi = f, y = H\varphi+\eta\} \to \inf_{\varphi}$. The main result is a sub-optimal minimax estimation of φ, valid for L with non-closed range, obtained through Tikhonov regularization approach. This result is then applied to the construction of the state estimation algorithm for uncertain linear differential-algebraic equation with variable coefficients.