

Reduced Models in State Estimation

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Modern data acquisition technologies offer a wealth of information that is more and more used, in particular, towards enhancing accuracy and prediction capability of classical mathematical models.

Properly synthesizing "model based" and "data driven" methodologies plays therefore an increasingly important role in virtually every branch of predictive sciences. This talk addresses Uncertainty Quantification in the context of related inversion tasks like state estimation. Specifically, given only a fixed finite number of measurements, we are interested in reconstructing states that can arise as solutions to a parametric family of PDEs.

Formulating state estimation in the context of Optimal Recovery, we highlight the role of reduced models for meeting certain optimality benchmarks in a worst case sense. Moreover, we address intrinsic obstructions encountered in regimes of high parameter dimensionality. (joint work with A. Cohen, R. DeVore, J. Fadili, O. Mula, J. Nichols)