

MODEL REDUCTION: ANALYSIS, NUMERICAL SOLUTION AND REAL WORLD APPLICATIONS

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Lecture I: Model reduction, a survey

Abstract

We will survey current model reduction techniques such as modal truncation, balanced truncation, proper orthogonal decomposition, discrete empirical interpolation, iterative rational Krylov algorithm and variations of these. The properties and advantages and disadvantages will be discussed.

Lecture II: Preservation of physical properties in model reduction methods

Abstract

The second lecture discusses the important properties of the preservation of physical properties in model reduction techniques, this includes stability or passivity preservation, as well as the preservation of constraints or invariants.

Lecture III: Model reduction in real world and industrial applications

Abstract

The third lecture will present several real world applications where model reduction is essential to carry efficient optimization and control processes. This includes the treatment of disk brake squeal, the control of pulse detonation engines, and optimal gas transport in gas networks. In this context, a number of challenges and open problems will be also discussed.