

Integrative Computational Studies Seminar Series

Dangers of Gramian based model reduction

Carl Christian Kjelgaard Mikkelsen
CS&E Doctoral Student
Department of Mathematics
Purdue University

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Abstract

Model reduction by truncation is a standard technique used in the analysis of dynamical systems. The main problem is the solution of a pair of adjoint Lyapunov matrix equations. The solutions are commonly known as the system Gramians. Recent research has focused on computing low rank approximations of the system Gramians. In this talk we explain why this is a dangerous approach. To this end we construct systems which are controllable and observable, but for which the Gramians are orthogonal to machine precision.

Carl Christian Kjelgaard Mikkelsen is a graduate student in the Department of Mathematics registered in the interdisciplinary Computational Science and Engineering Program at Purdue University. He received his MSc. degree in mathematics from the University of Aarhus, Denmark, in May 2003. In December 2008 he has successfully defended his Ph.D. dissertation on numerical methods for large Lyapunov equations and related problems.