Matrix Computations & Scientific Computing Seminar

Organizer: James Demmel & Ming Gu

Wednesday, 12:10–1:00pm, 380 Soda

Oct. 19 **Joel R Phillips**, Cadence Design Systems

Model Order Reduction in Electrical Circuit Analysis

The engineering of modern electronic systems is critically dependent on electronic design automation tools that enable the synthesis and analysis of very large-scale electrical circuits. One of the key components in contemporary circuit analysis has come from the application of model-order-reduction algorithms that evolved from a union of modern numerical linear algebra techniques and industrial experience in large-scale circuit simulation. Despite some widely-known open problems, little practical progress has been made in the past decade. This talk will begin by discussing the application domain, the types of starting systems it generates, how reduced-order-models interact with the rest of the analysis system, system requirements for algorithmic performance, and how these constraints have impacted algorithmic innovation in the area. Next we will discuss some open problems for linear-system reduction algorithms in an industrial context and outline some work in two directions: constructing models incrementally, and finding algorithms that are suited for systems with underlying sparse network topologies. Finally, we will discuss a problem that may be suitable for application of currently-available technology for reduction of nonlinear systems, discuss verification and validation of the models produced, and show some initial results.