OTTO VON GUERICKE UNIVERSITÄT MAGDEBURG

MAGDEBURG LECTURES ON OPTIMIZATION AND CONTROL

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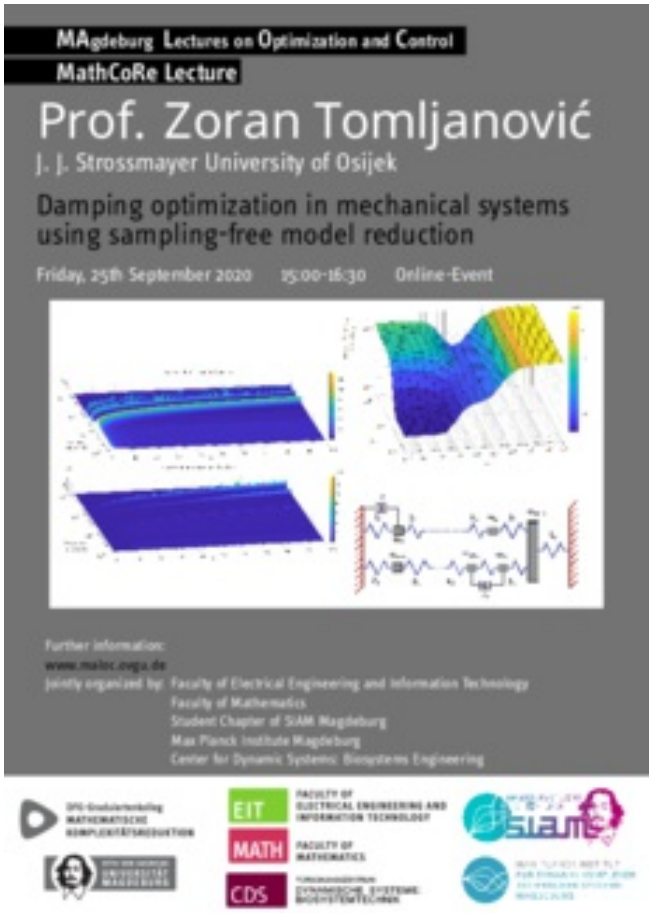

Damping optimization in mechanical systems using sampling-free model reduction

Time & Place

The online presentation on September 25, 2020 will be start at 3.00 p.m..

To see the online presentation please visit this link:
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We consider vibration analysis and vibration reduction for mechanical systems. Vibration reduction is very important in the study of mechanical systems and it is usually achieved by damping optimization. In damping optimization, the principal goal is to determine an optimal external damping matrix which will ensure optimal evanescence of systemâ€™s solution (i.e. evanescence of deviation from its equilibrium). One can consider different optimality measures for that purpose, which depend on particular applications. Thus, in the first part of the talk we present problem formulation and give an overview of a different optimality measures. In the second part of the talk we are focused on sampling-free model reduction of systems, which can be applied for efficient damping optimization. Furthermore, this can be also applied for model reduction of linear dynamical systems having an affine parameter dependence that allow low-rank variation in the state matrix. We propose an approach that requires neither parameter sampling nor parameter space exploration. Instead, we represent the system response function as a composition of four subsystem response functions that are nonparametric with a purely parameter-dependent function. The parametric structure of our reduced system representation lends itself very well to the development of optimization strategies making use of efficient cost function surrogates. We discuss this in detail for damping optimization of vibrating structures. We illustrate our approach on a class of numerical examples.