Cymer Center for Control Systems and Dynamics

# Embedded Model Predictive Control with Explicit Computational Constraints

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One of the major challenges in modern embedded controller synthesis is the ability to specify available computational power and storage as input design parameters. Our current work develops new systematic methods for making design tradeoffs amongst online processing time, storage space and controller performance for high-speed applications. This talk will focus on approximate solutions to “explicit model-predictive controllers”, in which the control laws are pre-computed offline, making on-line computation fast and simple. The proposed framework allows the design engineer to specify the available online computational power and storage resources. It then synthesizes an approximate controller that guarantees both system stability and feasibility while maximizing performance within the allocated complexity without recourse to tweaking or manual tuning.

**Colin Jones** is currently a senior researcher (Oberassistent) at the Automatic Control Laboratory in the Swiss Federal Institute of Technology (ETH) in Zurich. He obtained a PhD in 2005 from the University of Cambridge for his work on polyhedral computational methods for constrained control. Prior to that, he was at the University of British Columbia in Canada, where he took a BASc and MASc in Electrical Engineering and Mathematics. Colin has worked in a variety of industrial roles, ranging from control of heating, ventilation and air conditioning to ballistic missile interception. He is co-founder of Apex Optimization; a custom optimization house that focuses on human resource scheduling. His current research interests are in the areas of high-speed predictive control, optimization, energy management and optimal scheduling.