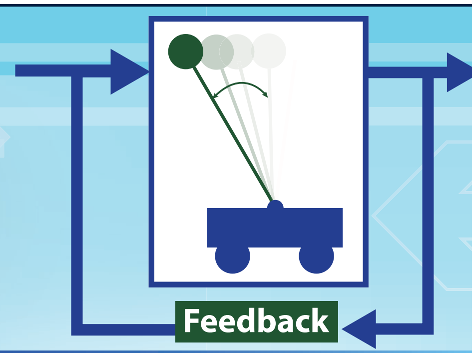
COLLEGE OF ENGINEERING

Control Seminar



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Bridging the Gap Between Controls Theory and Practice

LEILA BRIDGEMAN

Assistant Professor

Duke University

Friday, February 21, 2020

3:30 – 4:30 pm   1500 EECS Bldg.

ABSTRACT: The study of feedback control is arguably the most influential of engineering disciplines. Autonomous driving, spacecraft pointing, power systems regulation and modern cancer radiation therapy all hinge on the ability of a control system to robustly and reliably regulate system behaviour. Despite its diverse areas of application, the desire to optimize performance and guarantee acceptable behaviour in the face of inevitable uncertainty is pervasive throughout control theory. This creates a fundamental challenge since the necessity of robustly stable control schemes often favors conservative designs, while the desire to optimize performance typically demands the opposite. This talk will discuss how a return to one of the foundational results of input-output stability theory, George Zames' Conic Sector Theorem, has led to new controller design methods that aid in solving the most challenging of modern control problems.

BIO: Leila Bridgeman earned B.Sc. and M.Sc. degrees in Applied Mathematics in 2008 and 2010 from McGill University, Montreal, QC, Canada, where she completed her Ph.D. in Mechanical Engineering, earning McGill's 2016 D.W. Ambridge Prize for outstanding dissertation in the physical sciences and engineering. Her graduate studies involved research semesters at University of Michigan, University of Bern, and University of Victoria, along with an internship at Mitsubishi Electric Research Laboratories (MERL) in Boston, MA. She is now an assistant professor of Mechanical Engineering and Materials Science and a member of the Robotics Group at Duke University.

Through her research, Leila strives to bridge the gap between theoretical results in robust and optimal control and their use in practice. She explores how the tools of numerical analysis and input-output stability theory can be applied to the most challenging of controls problems, including the control of delayed, open-loop unstable, and nonminimum-phase systems. Her focus has been on the development of readily applicable controller synthesis and stability analysis methods based on the evaluation of linear matrix inequalities (LMIs). Resulting publications have considered applications of this work to robotic, process control, and time-delay systems.

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