

# DEPARTMENT OF MECHANICAL ENGINEERING

## WILLIAM MAXWELL REED SEMINAR SERIES

### **Dynamic Modeling and Control of Cable-Actuated Systems**

**James Richard Forbes, Ph.D.**  
McGill University

**Abstract:** The use of cable-actuated systems is widespread; elevators, towing systems, cranes, and cable robots are examples of systems actuated by cables. Cable-actuated systems typically feature stationary actuating winches, which reduces the moving mass of the system compared with standard serial (rigid-link) manipulators whose actuators are embedded in the manipulator, allowing for higher payload accelerations. Cable-actuated systems also allow for relatively large workspaces and high maximum payload to weight ratios. However, controlling cable-actuated systems remains a challenge due to their under-actuated or redundantly actuated nature, cable-flexibility, the requirement that cables only operation in tension, and the fact that available measurements are noisy and biased. After reviewing various applications of cable-actuated systems, this talk will discuss the modelling, control, and state-estimation of flexible cable-actuated systems.

**Bio:** James Richard Forbes (M'11) received the B.A.Sc. degree in mechanical engineering (Hons., Coop) from the University of Waterloo, Waterloo, ON, Canada, in 2006 and the M.A.Sc. and Ph.D. degrees in aerospace science and engineering from the University of Toronto Institute for Aerospace Studies, Toronto, ON, in 2008 and 2011, respectively. James is currently an Assistant Professor within the Department of Mechanical Engineering, McGill University, Montreal, QC, Canada. James' research interests include the dynamics and control of robotic and aerospace systems.

**Date:** October 14, 2016  
**Place:** CB 106

**Time:** 3:00 to 4:00p  
**Contact:** Dr. Alexandre Martin 257-4462

Meet the speaker and have refreshments  
Attendance open to all interested persons