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**Irena Lasiecka, Rich Marchand and Tim McDevitt\*** (McDevittT@etown.edu). *Boundary control of a beam equation with non-monotone boundary conditions.*

The goal of this talk is to present new control theoretic results for second order (in time) PDE scalar equations with boundary conditions that are non-monotone. Models of the type considered typically arise in the context of modeling long flexible robot arms. The non-monotonicity prohibits the use of standard analyses for well-posedness, such as fixed point methods, inherent to monotone structures. Instead, microlocal analysis on the boundary appears to be the key to showing that the underlying semigroup is of Gevrey's class, and that the associated control problem is well-posed within a standard finite energy space with controls that are not necessarily collocated. Although the methodology presented is applicable to more general multidimensional problems, the talk will focus on a one-dimensional Euler-Bernoulli beam equation. Numerical simulations will demonstrate spectral properties of the operators that complement the theoretical findings. (Received September 21, 2011)