Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

An Experimental Investigation of the Theory of Electrostatic Deflections[1] JAVED SIDDIQUE, Penn State York, ROBERT DEATON, ERIC SABO, JOHN PELESKO, University of Delaware — The so-called "pull-in" instability is a ubiquitous feature of electrostatic actuation. In systems where an applied voltage is used to actuate or move mechanical components, it is observed that when the applied voltage exceeds a critical value, electrostatic forces become dominant over elastic forces and the mechanical components "pull-in" or collapse into one another. This study of this instability is particularly relevant in the field of microelectromechanical and nanoelectromechanical systems (MEMS & NEMS), where electrostatic actuation is often used. This instability severely restricts the design space of such systems. Here, key theoretical results concerning this instability are surveyed and compared to a new experimental study of electrostatic deflections. Gaps between theory and experiment are uncovered and directions for future modeling and analysis indicated.

[1]J.A.P. thanks NSF, J.I.S. thanks Penn State York.

Javed Siddique
Penn State York

Date submitted: 05 Aug 2010 Electronic form version 1.4