# CCSU

## DEPARTMENT OF MATHEMATICAL SCIENCES

# COLLOQUIUM

Friday, September 24

3:00 – 4:00 PM

Maria Sanford, Room 101

# PERIODIC MOTIONS IN MEMS


## ANDRÉS RIVERA

**PONTIFICIA UNIVERSIDAD JAVERIANA CALI, COLOMBIA**



**Abstract:** Oscillations of mechanical devices are commonly modeled with Liénard equations. Examples of such devices are microelectromechanical systems (MEMS), and in particular the Nathanson actuator, Comb-drive finger, and Atomic force microscope. Perhaps, for any Liénard type equations, the most interesting question is about the study of periodic solutions since it implies periodic behaviors in the modeled devices. Recently, the method of lower and upper solutions has been successful at determining the existence, multiplicity, and stability of periodic solutions in the above devices. This talk explores this method further, but presents a generalization of the results by studying the existence of periodic solutions for the differential equation of type

$$\ddot{x} + c(t,x)\dot{x} + K(x)x = \frac{F(t)}{G(x)}.$$

From the general results, we obtained conditions for the existence of periodic solutions for the Nathanson and AFM model, considering squeeze-film damping. For each of these models, we present conditions that guarantee the linear stability of some of the periodic solutions.


**To join us online use the following link:**

https://ccsu.webex.com/meet/gotchev


**For further information:**

*gotchevi@ccsu.edu* 860-832-2839

http://www.math.ccsu.edu/gotchev/colloquium/