

2011-2012

# Graduate Seminar Series

## The Department of Mechanical Engineering – Engineering Mechanics

Proudly Presents

**Mehdi Ahmadian**  
**Professor and Director**  
**Center for Vehicle Systems & Safety**  
**Department of Mechanical Engineering**  
**Virginia Tech**



Mehdi Ahmadian is Professor of Mechanical Engineering at Virginia Tech, where he also holds the position of Director of Center for Vehicle Systems and Safety (CVeSS), and the Railway Technologies Laboratory (RTL). He is the founding director of CVeSS, RTL, Virginia Institute for Performance Engineering and Research (VIPER), and the Advanced Vehicle Dynamics Laboratory (AVDL). Dr. Ahmadian has authored more than 100 archival journal publications and more than 200 conference publications. He has made more than 200 technical presentations in topics related to advanced technologies for ground vehicles. He holds seven U.S. patents, and has edited four technical volumes. He currently serves as Editor for the International Journal of *Vehicle Systems Dynamics* and Editor-in-Chief for the journal of *Shock and Vibration*. He also serves on the Editorial Boards of the journal of *Smart Materials Research*, *Advances in Mechanical Engineering*, and *Mechanical Engineering*. In the past, he has served as Associate Editor for the ASME *Journal of Vibration and Acoustics* (1989 – 1996), the AIAA *Journal* (2000 – 2008), and journal of *Shock and Vibration* (2003 – 2011). Dr. Ahmadian is a Fellow of American Society of Mechanical Engineers (ASME), an Associate Fellow of the American Institute for Aeronautics and Astronautics (AIAA), and a member of the Society for Automotive Engineers (SAE). He is the recipient of the 2008 Society of Automotive Engineers (SAE) Forest R. McFarland Award.

**Thursday, Nov. 17, 2011    4:00 – 5:00 p.m.    Room 112, ME-EM Bldg.**

### **A Walk down the Memory Lane with Magneto Rheological Technology for Vehicle Applications**

Magneto rheological (MR) fluids consist of a carrier fluid and micron-sized ferrous particles that when subjected to a magnetic field enables the fluid to have a varying yield stress, dependant on the magnetic flux density. This presentation will provide a historical review of MR fluids for vehicle suspensions. It also provides the current state of MR devices as well as a perspective on the future direction of MR technology for vehicle applications. Some of the successes of the MR devices are discussed along with some of their challenges. It is noted that although our understanding of the MR fluids in valve and shear mode is reasonably advanced, their behavior in squeeze mode remains relatively unknown. The results of a preliminary study show that in squeeze mode MR fluids can provide a large range of forces that can be controlled with a relatively low amount of electrical power, making them suitable for compact force actuators that can be used in aerospace, automotive, robotics, and biomedical devices.