PRISM Seminar Series – Fall 2011

PRISM
NNSA Center for Prediction of Reliability, Integrity and Survivability of Microsystems

PURDUE UNIVERSITY Discovery Park

"Unsteady Rarefied Flow Simulations in N/MEMS"

Friday November 18, 2011
3:00 pm, Birck 1001

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Abstract: Further development of high-frequency microsystems such as resonators, RF MEMS, microturbines and pulsed-detonation microengines require improved understanding of unsteady gas dynamics at the microscale. At the microscale, the continuum equations tend to breakdown when the Knudsen number is greater than 0.1 and a model at the molecular level is required. And Direct Simulation Monte Carlo (DSMC) methods are very computationally expensive for such low speed unsteady near-continuum flows. In her thesis, Sruti formulated a fully deterministic finite volume based approach for solution of ES-BGK Boltzmann model kinetic equation with conservative discrete-ordinate velocity method to enable simulations of unsteady 3D rarefied flows in complex geometries. Sruti incorporated the rarefied flow formulation into MEMS Overall Simulation Administrator (MEMOSA), the solver developed by PRISM: NNSA Center for Prediction of Reliability, Integrity and Survivability of Microsystems at Purdue. In this talk, Sruti will concentrate on verification and validation of this parallel solver and application to the unsteady micro-scale gas damping in MEMS switches with opening and closing gaps. This solver has the added advantage of easy coupling to other deterministic solvers such as the Navier-Stokes equations and other structural solvers.

Bio: Sruti graduated from Indian Institute of Technology (IIT) Madras in 2006 with a Bachelor's degree in Aerospace engineering and was among the top three in her class. Soon after that she joined Purdue University and received her Masters degree in Aeronautics and Astronautics under the guidance of Prof. Alina Alexeenko. Inspired by the courses she took as part of the CS&E specialization at Purdue, Sruti interned at Artic Region Supercomputing Center, Alaska, the summer of 2008 where she worked on computationally intensive weather research models. In Fall 2008, she started her PhD program in Aero/Astro at Purdue. During her stay at Purdue, Sruti has been an active member of various student organizations including SIAM, WIEP and SWE. She will be graduating in December 2011 and is excited to join the Test R&D team at Intel, Arizona, the same lab where she interned last summer. She will be working on microscale heat transfer and micro fluidics and plans to move back to academia in a few years.

Refreshments will be served. For further information please contact Prof. Alina Alexeenko, alexeenk@purdue.edu
For information about PRISM visit: http://www.purdue.edu/discoverypark/prism