



Education and Lab Interactions

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Annual Review
October 31 – November 1, 2011

2010-2011 Activities

- New Course: Introduction to Uncertainty Quantification
- PRISM Seminar Series
- Workshops and symposia
 - UQ sessions and symposium at IMECE 2010, Vancouver, BC
 - Invited talks at NNIN/C Symposium on MEMS/NEMS Simulation (Aluru, Murthy)
 - NNSA V&V and UQ Workshop at Stanford, August 16-18, 2011
- Student Internships at the Labs

ME597/AAE590: Intro to UQ

- New graduate course in Fall 2010
- All PRISM graduate students + more = 36 registered
- Guest lectures by PRISM researchers
- All lectures and tutorials video recorded and available on <http://memshub.org>



ME597/AAE590: Intro to UQ

Week	Topic	Lecturer
27-Aug	Intro to Verification & Validation, Uncertainty Quantification	Alexeenko
3-Sep	Linear sensitivity analysis; finite difference, code differentiation	Mathur
10-Sep	Uncertainty propagation - sensitivity equation, variance propagation eqn, non-deterministic sampling (Monte Carlo, LHS)	Sun
17-Sep	Polynomial chaos - Galerkin and collocation	Xiu/Narayan
24-Sep	Polynomial chaos - Galerkin and collocation	Xiu/Narayan
1-Oct	Using MEMOSA UQ software	Hunt
8-Oct	Uncertainty quantification in experiments	Raman
15-Oct	Verification and validation of computational model	Alexeenko
22-Oct	No lecture	
29-Oct	Introduction to DAKOTA	Pax
5-Nov	Introduction to Bayesian methods and Bayesian calibration	Mahadevan
19-Nov	Uncertainty quantification for PRISM MEMS device	Alexeenko
26-Nov	No lecture (Thanksgiving)	
3-Dec	Uncertainty quantification across scales	Koslowski
10-Dec	Epistemic error in molecular dynamics; Closure	Strachan

Spring 2011 Seminar Series

- Feb 4: Ashlie Martini, Purdue/ME, *“Small Length and Time Scale Modeling for Real-World Interface Design”*
- Feb 11: Shankhadeep Das, Purdue/ME, *“A Finite Volume Method for Stress Analysis with Application to MEMS”*
- Feb 18: Ananth Grama, Purdue/CS, *“Emerging Opportunities, Challenges, and Applications in Exascale Computing”*
- April 1: Bill Crossley, Purdue/AAE, *“Some Examples of Design under Uncertainty for Aerospace Problems”*
- April 8: Allyson Hartzell, Lilliputian Systems, *“MEMS Reliability”*
- April 22: Graham Candler, University of Minnesota, *“Towards Mechanism-based Predictions of Transition to Turbulence in Hypersonic Flows”*
- April 29: Vikas Tomar, Purdue/AAE, *“Experiments and Models Regarding Strain Dependent Thermal Conductivity and Strength at the Nanoscale and Microscale ”*

Fall 2011 Seminar Series

- Oct 7: Tom Shih, Purdue/AAE, “*Quantifying Uncertainties from the Grid in CFD Solutions*”
- Oct 19: Robert Moser, UT Austin, “*Verification and Validation in Simulations of Complex Engineered Systems*”
- Nov 18: Sruti Chigullapalli, Purdue/AAE, “*MEMOSA ESBGK Solver: V&V and Applications to Microscale Gas Damping Simulations*”
- Dec 2: Ali Beskok, Old Dominion University, “*MD Simulations of Gas Flows in Nano-Channels and Interface Thermal Resistance Between Simple Liquids and Solids*”
- Dec 16: Tim Germann, LANL

2011 Lab Interns

Student	Lab	PRISM faculty
James Loy	LLNL	J. Murthy
Josh Mullins	Sandia	S. Mahadevan
Hojin Kim	LANL	A. Strachan
	(being arranged)	

Total PRISM student internships in NNSA Labs: 12

PRISM Employees at the Labs

Abby Hunter (LANL)
Bob Sayer (Sandia)

Computational Science and Engineering (CSE)

- Interdisciplinary graduate specialization program www.cse.purdue.edu
- 14 core courses in HPC Architectures, Parallel Algorithms, Programming, and Visualization
- 2010-2011 courses by PRISM faculty:
 - ME 608 – Numerical Methods for Heat, Mass and Momentum Transfer (J. Murthy)
 - CS 525 – Parallel Computing (A. Grama)
 - AAE 590 – Molecular Gas Dynamics (A. Alexeenko)
 - CS 51500 – Numerical Linear Algebra (S. Sameh)
 - CS 51501 – Parallelism in Numerical Linear Algebra (A. Sameh)
 - MA 692D – High Performance Computing (S. Dong)