Biomedical Engineering
University of Michigan

Mechanical Engineering
KAIST
Korea Advanced Institute
of Science and Technology

Lawrence Livermore
National Laboratory

Macromolecular Science
and Engineering Center

the department of
MECHANICAL ENGINEERING
at the University of Michigan

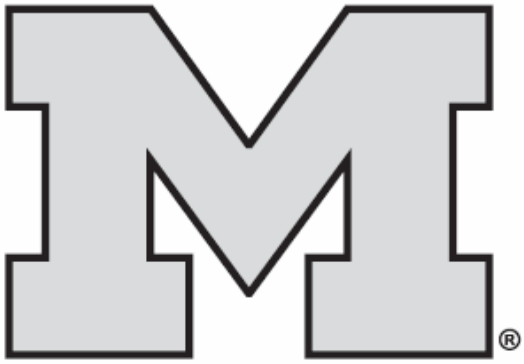
Rackham

Materials Science and Engineering

MichiganEngineering

Schlumberger

2005
ENGINEERING



GRADUATE STUDENT SYMPOSIUM

October 29, 2005
University of Michigan
College of Engineering
Ann Arbor, MI

Sponsored by:

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Department of Materials Science and Engineering
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College of Engineering
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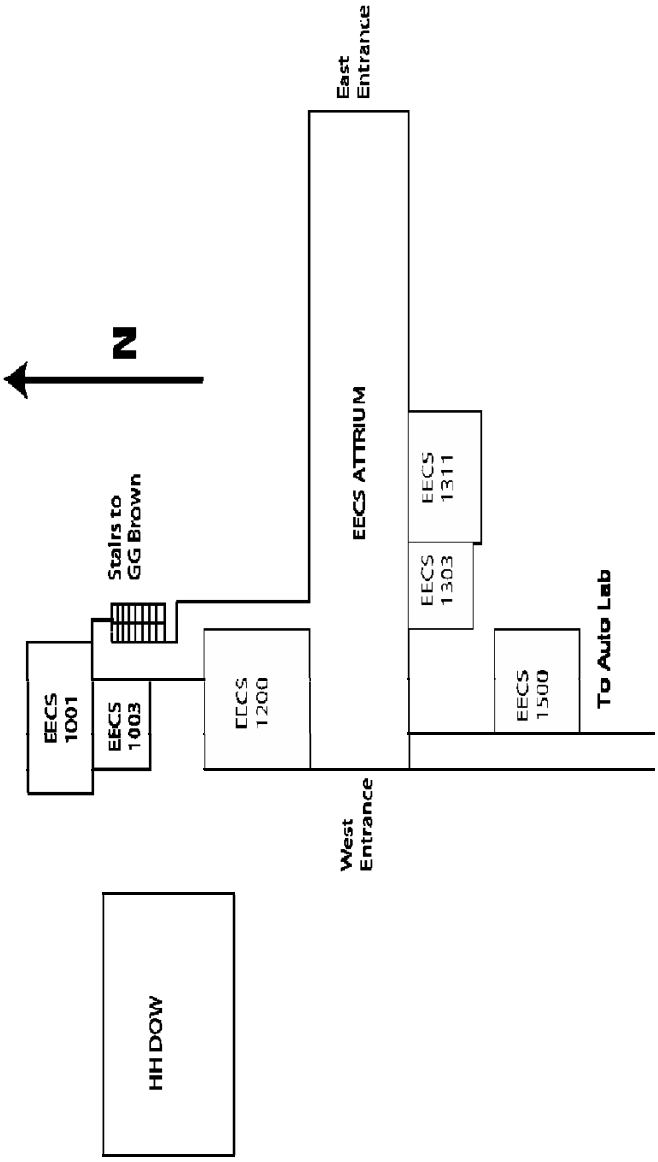
www.slb.com

All sessions are held in the EECS building on the University of Michigan's North Campus.



For additional maps and directions, please refer to www.umich.edu/~info/maps.html

Dear Attendees,

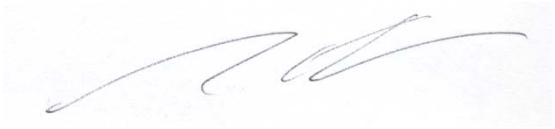
NOTES

On behalf of the College of Engineering, our sponsors, and the organizing committee, I would like to welcome you to the 2005 Engineering Graduate Student Symposium.

The symposium was started in the year 2000 by the graduate students of Mechanical Engineering to showcase their research, practice their presentation skills, and receive recognition from their peers. Today, the symposium has grown to include participants from the Biomedical Engineering Department, the Materials Science and Engineering Department, the Macromolecular Science and Engineering Center, and the Korea Advanced Institute of Science and Technology (KAIST).

The purpose of the symposium is for students, faculty, members of industry, and alumni to come together and interact in a casual environment on the topics of engineering and science. Feedback to those giving talks and presenting posters is most welcome and encouraged! Feel free to attend sessions outside of your area of expertise, ask questions, and share experiences and results from your own research.

To help make future symposiums even better, please tell us a little bit about yourself by filling out a survey. Thank-you for your attendance and have fun!



Jon Kadish
Chair, 2005 Engineering Graduate Student Symposium

NOTES

2005 Engineering Graduate Student Symposium

October 29, 2005

Symposium Organizers:

Linda Chow
Darius Dixon
Amit Dhingra
Karim Hamza
Jeongwoo Han
Simmi Isaac
Bhumika Lathia
Jenny Lee
Jiayin Li
Jon Kadish
Kristen Mills
Harish Narayanan
Xiulin Ruan
Bryon Sohns
Jon Song
Songtao Tang

Presentations

Dynamics, Systems and Controls
Chair: Bhumika Lathia

1311 EECS

Lim Soo-Chul **9:00-9:20**
Complex Stiffness Extraction of Diaphragm in the Pneumatic Spring for Vibration Isolation Tables

Ercan Dede **9:20-9:40**
Analysis, Design and Optimization of Structures with Integral Compliant Mechanisms for Mid Frequency Response

Tulga Ersal **9:40-10:00**
A Simplification Technique for Modular Models of Reconfigurable Machine Tools

Sungmok Hwang **10:00-10:20**
Detection of Speaker Position for Robot Using HRTF

Aftab Khan **10:20-10:40**
Predictive Inspection Based Control and Diagnostics for Manufacturing Process

Kevin King **10:40-11:00**
The Dynamics of the Golf Swing as Measured by Strap Down Inertial Sensors

Jeung-Hoon Lee **11:00-11:20**
Complex Stiffness Extraction of Diaphragm in the Pneumatic Spring for Vibration Isolation Tables

LUNCH BREAK AND INDUSTRY PRESENTATIONS

Linda Chow, Zhongde Wong, and Brian Jensen **DM-13**
Skin Effects Aggregated Heating in RF MEMS Suspended Structures

Biomedical Engineering

William A. Grissom **BM-1**
A Linear Class of Large-Tip-Angle RF Pulses for Parallel Excitation in MRI

Rui He **BM-2**
Impact of Pitch, Taper, and Tool Length on Structural Characteristics of Nickel-Titanium Endodontic Instrument Through Finite Element Analysis

Szushen Ho **BM-3**
3-D Single-Walled Carbon Nanotube Biosensor

W.S. Kim **BM-4**
A Nobel Light-Weight Navigation System for Acetabular Component: Non Image Based Registration

Wooseok Ko **BM-5**
Development and Optimization of a Non-Contact Near-Infared Spectroscopy System for Image Reconstruction Inside Tissue

Mai T. Lam **BM-6**
Studying Changes in Force Production in Skeletal Muscle Constructs by Reducing Reactive Oxygen Speices

Hwankyu Lee **BM-7**
Molecular Dynamics Simulations of the Anchoring and Titling of the Lung-Surfactant Peptide SP-B_{1-25} in Palmitic Acid Monolayers

Todd Lillian **BM-8**
Modeling Intrinsic Curvature Effects on LacR-DNA Loop Complexes

HongKi Yoo **BM-9**
Measuring PSFs for Flourescence Nanoscopy

NOTES

Schedule of Events

9:00-11:30	Morning Sessions *Dynamics, Systems and Controls* 1311 EECS *Design and Manufacturing* 1200 EECS *Fluid Mechanics and Heat Transfer* 1001 EECS *Solid Mechanics* 1303 EECS *Materials* 1003 EECS *Biomedical Engineering* 1301 EECS
11:30-12:00	*Schlumberger Presentation* 1500 EECS
12:00-1:00	*Lunch & Posters* – EECS Atrium
1:00-1:30	*Lawrence Livermore National Labs Presentation* – 1500 EECS
1:30-4:15	Afternoon Sessions *Dynamics, Systems and Controls* 1311 EECS *Design and Manufacturing* 1200 EECS *Fluid Mechanics and Heat Transfer* 1001 EECS *Biomedical Engineering* 1301 EECS
4:30-5:00	*Awards* – 1500 EECS

Design and Manufacturing
Chair: Karim Hamza

1200 EECS

Abigail Reid Mechtenberg **9:00-9:15**
GEM-H_2: Gasoline Electric Motor Hydrogen Hybrid Optimization Viability Study

Kiyoun Kwon **9:15-9:30**
A New Indirect Quadrilateral Mesh Generation with Zero-Thickness Layer

James T. Allison **9:30-9:45**
Practical Advances in Optimal System Design

Jungeun An **9:45-10:00**
Tolerance Design of Automobile Parts using Design of Experiments

Shingo Takeuchi **10:00-10:15**
Design for Product-Embedded Disassembly

Mohammed Shalaby **10:15-10:30**
Design of Heat-Reversible Snap Fits For Space Frame Bodies

W. Ross Morrow and Jeremy Michalek **10:30-10:45**
Plotting the Market Response to Regulation: Environmental Policy in the Automobile Industry

Hong Seok Youn **10:45-11:00**
A Study on High-Precision CNC Tool Grinding System using Machine Vision

Erin MacDonald, Alexis Lubensky, and Bryon Sohns **11:00-11:15**
Product Semantics in Wine Portfolio Optimization

LUNCH BREAK AND INDUSTRY PRESENTATIONS

Dynamics, Systems, and Controls

Lim Soo-Chul **DSC-1**
Vibrotactile Pattern Perception for Wheel Chair Robot

Tulga Ersal **DSC-2**
A Simplification Technique for Modular Models of Reconfigurable Machine Tools

Sungmok Hwang **DSC-3**
Detection of Speaker Position for Robot Using HRTF

Jeung-Hoon Lee **DSC-4**
Complex Stiffness Extraction of Diaphragm in the Pneumatic Spring for Vibration Isolation Tables

Kevin King **DSC-5**
The Dynamics of the Golf Swing as Measured by Strap Down Inertial Sensors

Andreas Malikopoulos **DSC-6**
Modeling of an Integrated Starter Alternator (ISA) System for the HMMWV

Dong Il Park **DSC-7**
Design and Optimization of Variable Geometry Single Tracked Mechanism for Climbing Stairs

Sang-Hyun Park **DSC-8**
Design and Control of the Small Size Hybrid Type Active Magnetic Bearing for Rotating Disk Systems

Ashish Deshpande **DSC-9**
Towards the Development of a Unified Framework to Represent Physically Cooperating Mobile Robots

Yun-Ho Shin **DSC-10**
Consideration of Static-Strain-Dependent Dynamic Complex Modulus in Dynamic Stiffness Calculation of Mount/Bushing by Commercial Finite Element Codes

Design and Manufacturing

James T. Allison **DM-1**
Practical Advances in Optimal System Design

E. Emanuel Almeida **DM-2**
Modular Finite State Machines Implemented As Event-Condition-Action Systems

Jungeun An **DM-3**
Tolerance Design of Automobile Parts using Design of Experiments

Jaspreet S. Dhupia **DM-4**
Dynamics of the Arch-Type Reconfigurable Machine Tool

Jonghan Jin, Yong-Jin Kim, and Seung-Woo Kim **DM-5**
Precision Length Metrology using the Optical Comb of Femtosecond Pulse Lasers

Hyun-Jung Kim and Sung-Kie Youn **DM-6**
A Study on the High Frequency Induction Welding

Kiyoun Kwon **DM-7**
A New Indirect Quadrilateral Mesh Generation with Zero-Thickness Layer

Erin MacDonald, Alexis Lensky, and Bryon Sohns **DM-8**
Product Semantics in Wine Portfolio Optimization

Hyunseok Oh and Choong Don Yoo **DM-9**
Improvement of Welding Quality Using End Current Control in Capacitor Discharge Stud Welding

Sang Hu Park and Tae Woo Lim **DM-10**
Development of Nano-Stereolithography Process for the Direct Fabrication of Three-Dimensional Nano/Microstructures

Mohammed Shalaby **DM-11**
Design of Heat-Reversible Snap Fits for Space Frame Bodies

Hong Seok Youn and Min Yang Yang **DM-12**
A Study on High-Precision CNC Tool Grinding System Using Machine Vision

1311 EECS

Andreas Malikopoulos **1:40-2:00**
Modeling of an Integrated Starter Alternator (ISA) System for the HMMWV

Dong Il Park **2:00-2:20**
Design and Optimization of Variable Geometry Single Tracked Mechanism for Climbing Stairs

Sang-Hyun Park **2:20-2:40**
Design and Control of the Small Size Hybrid Type Active Magnetic Bearing for Rotating Disk Systems

Yun-Ho Shin **2:40-3:00**
Consideration of Static-Strain-Dependent Dynamic Complex Modulus in Dynamic Stiffness Calculation of Mount/Bushing by Commercial Finite Element Codes

Kyungwon Suh **3:00-3:20**
Robust Fuel Cell Power System for Transportation Through Feedback Control and Estimation

Konstantinos Varsos **3:20-3:40**
Superposition Methods for Distributed Manipulation Using Quadratic Potential Force Fields

Shih-Hsun Yin **3:40-4:00**
Damage Detection Based on Enhanced NonLinear Dynamics

Ashish Deshpande **4:00-4:20**
Towards the Development of a Unified Framework to Represent Physically Cooperating Mobile Robots

Fluid Mechanics and Heat Transfer
Chair: Xiulan Ruan

1001 EECS

Kyoungjoon Chang **9:00-9:15**
1-D Cycle Simulation and Thermal Networks to Develop Strategies for Load-Speed Changes in HCCI Engine with Re-Breathing

Seung Hwan Keum **9:15-9:30**
Preliminary Numerical Study on Reformed Gas Assisted Combustion Modeling

Sangseok Yu **9:30-9:45**
High Fidelity Proton Exchange Membrane Fuel Cell Modeling for Thermal Management

Chinar R. Aphale **9:45-10:00**
Modeling and Parametric Study of Torque in Open Clutch Plates

Dong Gu Kang **10:00-10:15**
Natural Convection in an Enclosure Under Time-Periodic Magnetizing Force

Songtao Tang **10:15-10:30**
Numerical Modeling of Radiative Extinction of Spherical Diffusion Flames Under Microgravity Conditions

Baoling Huang **10:30-10:45**
MD Phonon Conductivity Prediction of a Metal-Organic Framework (MOF-5)

Gi Suk Hwang **10:45-11:00**
Fluid Flow and Heat Transfer in the Star Wick

Xiulin Ruan **11:00-11:15**
Enhanced Laser Cooling Using Ion-Doped Nanopowders

LUNCH BREAK AND INDUSTRY PRESENTATIONS

Posters

Fluid Mechanics and Heat Transfer

Paddy Chan **FM-1**
Time-Resolved Temperature Measurements of Self-Organized GaAs Quantum Dot Lasers

Kyoungjoon Chang **FM-2**
3-D Single-Walled Carbon Nanotube Biosensor

Claudia Fajardo **FM-3**
Flow Field Imaging Near the Spark Plug in a Firing IC Engine

Baoling Huang **FM-4**
MD Phonon Conductivity Prediction of a Metal-Organic Framework (MOF-5)

Gi Suk Hwang **FM-5**
Fluid Flow and Heat Transfer in the Star Wick

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Natural Convection in an Enclosure under Time-Periodic Magnetizing Force

SeungHwan Keum **FM-7**
Preliminary Numerical Study on Reformed Gas Assisted Combustion Modeling

Chi Young Lee and Sang Yong Lee **FM-8**
Assessment of Boiling and Condensation Heat Transfer Correlations for R404A Flow in a Horizontal Smooth Tube

Joung-Ho Lee **FM-9**
Response of Spatially-Developing Turbulent Boundary Layer to Spanwise Oscillating Lorentz Force

James Smith **FM-10**
High-Speed Crank-Angle Resolved Laser-Induced Flourescence for Engine Diagnostic Applications

Songtao Tang **FM-11**
Transient Ignition, Combustion, and Extinction Process for Highly Radiating Diffusion Flame

Rui Zhang **FM-12**
Two-tracer Laser-Induced Fluorescence (LIF) Experiment in an Optical GDI Engine

Solid Mechanics and Materials

David Salac **SMM-1**
Programmable Nanoscale Domain Patterns in Multilayers

Paul Podsiadlo **SMM-2**
Multifunctional Nanostructured Composites Prepared with Layer-By-Layer Assembly Technique

Chandresekhar Shankar **SMM-3**
Evolution of Mechanical Properties of Cross-linking Polymers: A Reactive MD Simulation Approach

Feng Qi **SMM-4**
Structure and Electronic Properties of Acene-Functionalized Polyhedral Oligomeric Silsesquioxanes (POSS)

Angela Knapp **SMM-5**
Analysis of Carbon Nanotube Formation Using Electric-Arc Discharge

Leenaporn Jongpaiboonkit **SMM-6**
Mechanical Behavior of Complex 3D Calcium Phosphate Cement Scaffolds Fabricated by Indirect Solid Freeform Fabrication

Thanh Ba Do **SMM-7**
The oxidation behaviors of BN with the addition of sintering aids Al_2O_3, Y_2O_3 and SiO_2

Jin Sung Kim and Kang Wook Lee **SMM-8**
Evaluation of Dynamic Tensile Characteristics of Polypropylene with Temperature Variation

Jong Youn Park, Young-Sam Cho, and Sung Youb Kim **SMM-9**
Multi-scale Modeling for the Mechanical Behavior of Membrane-like Structure

Keum-Oh Lee **SMM-10**
A Cyclic Deformation Analysis Using a Rheological Model in High Temperature

Byeong-Hyeon Ju **SMM-11**
Reliability-Based Design Optimization Considering Durability

Joonghyuk Kim, Sangbok Kim, and Sang Soo Kim **SMM-12**
Generation of Unagglomerated Nanoparticles by Laser Ablation in the Solution with Unipolar Charge by Electrospray

1200 EECS

Jonghan Jin, Yong-Jin Kim, and Seung-Woo Kim **1:45-2:00**
Precision Length Metrology using the Optical Comb of Femtosecond Pulse Lasers

J.W. Han **2:00-2:15**
Optimal design of hybrid and load-following fuel cell vehicles

Jaspreet S. Dhupia **2:15-2:30**
Dynamics of the Arch-Type Reconfigurable Machine Tool

Hyun-Jung Kim and Sung-Kie Youn **2:30-2:45**
A study on the high frequency induction welding

Andres F. Clarens **2:45-3:00**
Feasibility of Metalworking Fluids Delivered in Supercritical Carbon Dioxide

BREAK (15 MINUTES)

Sang Hu Park and Tae Woo Lim **3:15-3:30**
Development of Nano-Stereolithography Process For the Direct Fabrication of Three-Dimensional Nano/Microstructures

Hao Du **3:30-3:45**
Signature Analysis of Aluminum GMAW

Hyunseok Oh and Choong Don Yoo **3:45-4:00**
Improvement of welding quality using end current control in Capacitor Discharge stud welding

Linda Chow, Zhongde Wong, and Brian Jensen **4:00-4:15**
Skin Effects Aggregated Heating in RF MEMS Suspended Structures

Solid Mechanics
Chair: Linda Chow

1303 EECS

David Salac **9:00-9:20**
Programmable Nanoscale Domain Patterns in Multilayers

Xuan Tran and Sun-Tae Hong **9:20-9:40**
Influence of Cell Parameters on Yield Criterion of Aluminum Honeycombs Under Out-of-plan Combined Loads

Kyoo Sil Choi **9:40-10:00**
Effect of Roller Geometry on Contact Pressure and Residal Stress in Crankshaft Fillet Rolling

Jin Sung Kim and Kang Wook Lee **10:00-10:20**
Evaluation of Dynamic Tensile Characteristics of Polypropylene with Temperature Variation

Jong Youn Park, Young-Sam Cho, and Sung Youb Kim **10:20-10:40**
Multi-scale Modeling for the Mechanical Behavior of Membrane-like Structure

Keum-Oh Lee **10:40-11:00**
A Cyclic Deformation Analysis Using a Rheological Model in High Temperature

Byeong-Hyeon Ju **11:00-11:20**
Reliability-Based Design Optimization Considering Durability

LUNCH BREAK AND INDUSTRY PRESENTATIONS

Biomedical Engineering
Chair: Jon Song

1301 EECS

W.S. Kim **9:00-9:20**
A Novel Light-Weight Navigation System for Acetabular Component: Non Image Based Registration

Wooseok Ko **9:20-9:40**
Development and Optimization of a Non-Contact Near-Infrared Spectroscopy System for Image Reconstruction Inside Tissue

HongKi Yoo **9:40-10:00**
Measuring PSFs for Fluorescence Nanoscopy

Geeta Mehta **10:00-10:20**
Non-invasive Quantitative Oxygen Measurements in Perfused Micro-Bioreactors Arrays

Fabio Albano **10:20-10:40**
Design of Power Systems for Fully Implantable Medical Devices

Mai T. Lam **10:40-11:00**
Micropatterns with Wavy Features Align Skeletal Muscle Myoblasts and Myotubes

Rainer Ng **11:00-11:20**
Effect of a Membrane Sealing Polymer on Contraction-Induced Injury In Dystrophic Mice

LUNCH BREAK AND INDUSTRY PRESENTATIONS

1301 EECS

Rui He **1:40-2:00**
Impact of Pitch, Taper, and Tool Length on Structural Characteristics of Nickel-Titanium Endodontic Instrument Through Finite Element Analysis

Todd Lillian **2:00-2:20**
Modeling Intrinsic Curvature Effects on LacR-DNA Loop Complexes

Materials
Chair: Darius Dixon

1003 EECS

Paul Podsiadlo **9:00-9:20**
Multifunctional Nanostructured Composites Prepared with Layer-By-Layer Assembly Technique

Chandrasekhar Shankar **9:20-9:40**
Evolution of Mechanical Properties of Cross-linking Polymers: A Reactive MD Simulation Approach

Feng Qi **9:40-10:00**
Structure and Electronic Properties of Acene-Functionalized Polyhedral Oligomeric Silsesquioxanes (POSS)

Xi `Charles` Zhang **10:00-10:20**
Molecular Dynamics Simulation of Tethered Nanocube Assembly

Yoosuf N. Picard **10:20-10:40**
Transmission Electron Microscopy Studies of Femtosecond Laser Induced Damage

Jose Axurdia **10:40-11:00**
Novel Metastable Nickel Alumina Spinel Nanopowders via LF-FSP

Joonghyuk Kim, Sangbok Kim, and Sang Soo Kim **11:00-11:20**
Generation of Unagglomerated Nanoparticles by Laser Ablation in the Solution with Unipolar Charge by Electrospray

LUNCH BREAK AND INDUSTRY PRESENTATIONS

1001 EECS

Chi Young Lee and Sang Yong Lee **1:45-2:00**
Assessment of Boiling and Condensation Heat Transfer Correlations for R404A Flow in a Horizontal Smooth Tube

Anshuman Roy **2:00-2:15**
Analysis of Polymer Mass Transfer in a Turbulent Boundary Layer

Rui Zhang **2:15-2:30**
Two-tracer Laser-Induced Fluorescence (LIF) Experiment in an Optical GDI Engine

Paddy Chan **2:30-2:45**
Time-Resolved Temperature Measurements of Self-Organized GaAs Quantum Dot Lasers

Claudia Fajardo **2:45-3:00**
Flow Field Imaging Near the Spark Plug in a Firing IC Engine

BREAK (15-MINUTES)

James Smith **3:15-3:30**
High-Speed Crank-Angle Resolved Laser-Induced Fluorescence for Engine Diagnostic Application

Anshuman Roy **3:30-3:45**
Viscoelastic Catenary – Hoisting and Sagging

Joung-Ho Lee **3:45-4:00**
Response of Spatially-Developing Turbulent Boundary Layer to Spanwise Oscillating Lorentz Force