



# Mechanics Division

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## *NEWSLETTER*

Spring 2010

Chair: Gary L. Gray  
Secretary: Chris Papadopoulos

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Visit the Mechanics Division Website <http://comp.uark.edu/~jjrencis/aseemechanics/>

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### Message from the Chair

Dear Mechanics Division Members:

The 2010 Annual Conference and Exposition in Louisville, KY is almost here and, while the newsletter is a bit late this year, it is still technically spring (at least according to astronomers).

Anna Dollár, this year's exceptional Program Chair, has put together a very nice program for this year's meeting that should have something for everyone. In what is becoming a bit of a tradition, we will once again have a session on mechanics classroom demonstrations, which I hope you are all able to attend.

For the third year in a row, the Mechanics Awards Banquet is going to take place while cruising on a boat. The past two years have been a blast and I don't expect this year to be any different. I guess this means the pressure is on for another boat cruise in Vancouver in 2011.

In addition to the technical sessions and the awards banquet, I encourage you to attend the Mechanics Division Executive Committee meeting (Room L4, 7:00-8:15 on Monday) and the Mechanics Division Business meeting (Room 211, 12:30-2:00 on Wednesday). This is the place to share your ideas for the division and to get involved in the division's activities.

On a personal note, I want to profoundly thank Anna Dollár, Nancy Denton, and Chris Papadopoulos for all they did to pick up the slack for me during what was a difficult year. I am very grateful.

I look forward to seeing you in Louisville!

Gary L. Gray  
Mechanics Division Chair, 2009–2010  
[gray@enr.psu.edu](mailto:gray@enr.psu.edu)

## Comments on the 2010 Mechanics Division Program

This year the Mechanics Division sponsors two technical sessions on Monday (1468 and 1568), and two on Tuesday (2268 and 2468). The total of twenty four papers will be presented. Additionally there will be several other mechanics papers in sessions co-sponsored with the Mechanical Engineering Division and in the poster session. These papers represent a diverse range of educational activities going on in Mechanics education across the country and should provide us all with some very exciting new ideas.

I want to personally thank all the division members who volunteered to review abstracts and papers for their service and their valued and informed opinions. The quality of this year's program is due in great measure to their constructive criticism of the submitted papers. Also, thanks to those who volunteered and will serve as moderators for our sessions.

There is a lot to see and hear in the technical sessions this year and I hope that you can attend all of them to see what your colleagues have been up to in their classes and engineering education research. In addition, I am inviting everyone to bring along their favorite mechanics classroom demonstrations for showing in Session 1468 "Simple Engineering Mechanics Classroom Demonstrations" on Monday, June 21 at 12:30 PM. This session will give you the opportunity to show off and share some of your favorite in-class demos that you use in statics, dynamics, mechanics of materials, and vibrations (other mechanics courses are welcome). Please be sure to let the session moderators, Gary L. Gray (gray@enr.psu.edu) or Eric Bell (ebell@triton.edu), know by June 7<sup>th</sup> what you are planning to demonstrate so they can appropriately allocate time for each presenter.

In addition to the technical sessions, please mark your calendars for the following events that are open to anyone interested in the Mechanics Division activities:

- Mechanics Division Executive Committee Meeting (1168) at 7:00 - 8:15 a.m. on Monday
- Awards Banquet Dinner & River Cruise (2768) on Tuesday evening, 6:30-8:30 pm (the cruise boat departs at 6:30 pm from the 4<sup>th</sup> Street Wharf, located near the Convention Center)
- Mechanics Division business meeting (3468) on Wednesday at 12:30-2:00 p.m.

No meals will be provided at the executive and business meetings so attendees are encouraged to bring breakfast or lunch purchased from a local vendor to the meeting. A ticket is required for the dinner and cruise Tuesday night. I want to thank Michael Hardin for his work in arranging the cruise.

If you have any questions or comments about the program, please don't hesitate to contact me. See you in Louisville!

Best regards,  
Anna Dollár  
2009–2010 Mechanics Division Program Chair  
dollara@muohio.edu

## **Mechanics Division Awards Banquet (Session 2768)**

Tuesday, June 22, 6:30pm – 8:30pm

The Mechanics Division Annual Awards Banquet will take place Tuesday, June 22, aboard the CQ Princess Cruise. The boat departs at 6:30 pm from the 4th Street Wharf (walking distance from Convention Center) and returns at about 8:30 pm. Boarding begins at 6:15 pm with cast off at 6:30 pm.

Great company, wonderful food, fascinating conversation, and an exhilarating cruise all rolled into one. It's truly an event not to be missed. Please sign up early to help us planning this event.

### **Registration**

The cost per person is \$75 pre-registration. Guests welcome. On-site registration is NOT guaranteed. As of the printing of this newsletter, online registration is closed. To register, please contact Jon-Michael Hardin, Program Chair Elect, at [hardinj@vmi.edu](mailto:hardinj@vmi.edu) no later than June 14, 5:00pm.

## **Mechanics Division Award Recipients, 2010**

The Mechanics Division is pleased to announce the following winners of its 2010 awards who will be recognized at the Banquet. Please join us in congratulating these colleagues.

### **Archie Higdon Distinguished Mechanics Educator Award**

*James R. Barber, University of Michigan*

### **Ferdinand P. Beer and E. Russell Johnston, Jr. Outstanding New Mechanics Educator Award**

*Purohit Prashant, University of Pennsylvania*

*Major Nicholas O. Melin, U.S. Military Academy*

### **Meriam Service Award**

Not awarded this year

### **Mechanics Division Best Paper Award (2010 Annual Conference)**

*Anna Dollár and Paul Steif*

“Using a Digital Dashboard for Learning to Blend Interactive, Web-based Courseware into an Instructor-led Statics Course”

*Brian Self and James Widmann*

“Dynamics Buzzword Bingo: Active/Collaborative/Inductive Learning, Model Eliciting Activities, and Conceptual Understanding”

### **Mechanics Division Best Presentation Award (2009 Annual Conference)**

*Gary L. Gray*

“Some Simple Dynamics Demos”

in Session 1468: Simple Classroom Demonstrations for Engineering Mechanics

## 2010 Conference Sessions: Mechanics Division

**Monday, June 21, 2010**

### **1168: Mechanics Division Executive Committee Meeting**

7:00-8:15 a.m. Kentucky International Convention Center, L4

**Moderator(s):** Gary L. Gray, Pennsylvania State University

**Division(s):** Mechanics Division

Annual Executive Committee Meeting of the mechanics division. All are welcome.

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### **1468: Simple Engineering Mechanics Classroom Demonstrations**

12:30-2:00 p.m. Kentucky International Convention Center, L4

**Moderator(s):** Eric Bell, Triton College; Gary L. Gray, Pennsylvania State University

**Division(s):** Mechanics Division, Mechanical Engineering Division

This session's panels will give instructors of engineering mechanics courses (e.g., statics, dynamics, mechanics of materials, fluids, vibrations, etc.) the opportunity to observe valuable in-class demos presented by experienced instructors. Short descriptions of the demos provided by the panelists will be sent to Mechanics Division and Mechanical Engineering Divisions members via email shortly after the conference.

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### **1566: Mechatronics in the Curriculum (Panel Discussion)**

2:15-4:00 p.m. Kentucky International Convention Center, 217

**Moderator(s):** Rohti Shenoy, The MathWorks

**Division(s):** Mechanical Engineering Division

Mechatronics systems include mechanics, electronics, controls, and software. In today's world, where embedded controllers are found everywhere, from cars to washing machines, many machines and devices are essentially mechatronic systems. For a recent graduate entering industry, the breadth of knowledge needed is tremendous. In a perfect world, mechanical, electrical, biomedical, aerospace and computer engineers would share a common language and understand each other's design constraints. An engineering education that includes some study of mechatronics exposes students to multiple disciplines and thus better prepares them for successful careers.

This panel discusses the value of a mechatronics education in relation to the feasibility of adding mechatronics courses or programs to existing curriculum. How can a student who specializes in structural mechanics or optics also know enough to be effective on a multidisciplinary project? Does mechatronics have to be an alternative to focused study, or can both co-exist in current engineering curricula? These are some of the questions that our panel from academia and industry will address. The academic panelists will discuss the challenges universities face in building hands-on labs and also the role of software tools. Industry panelists will share their perspective on what students can expect and on the role they want academia to play.

Speaker: Kevin Craig, Marquette University

Speaker: Rungun Nathan, Pennsylvania State University, Berks

Speaker: James Peyton-Jones, Villanova University

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### **1568: Teaching Mechanics of Materials & General Mechanics Education**

2:15-4:00 p.m. Kentucky International Convention Center, L4

**Moderator(s):** Anna Dollár, Miami University Ohio; Laura Ruhala, Southern Polytechnic State University

**Division(s):** Mechanics Division

This session will focus on innovations in the teaching of Mechanics of Materials and on the general practice of mechanics education.

AC 2010-88: ENRICHING STUDENTS' STUDY OF BEAM REACTIONS AND DEFLECTIONS: FROM SINGULARITY FUNCTIONS TO METHOD OF MODEL FORMULAS

Ing-Chang Jong, University of Arkansas

AC 2010-2340: ON STOCHASTIC FINITE ELEMENT ANALYSIS OF BAR STRUCTURES

Ganapathy Narayanan, The University of Toledo

AC 2010-190: REGRESSION MODELS FOR PREDICTING STUDENT ACADEMIC PERFORMANCE IN AN ENGINEERING DYNAMICS COURSE

Shaobo Huang, Utah State University  
Ning Fang, Utah State University

AC 2010-2141: DEVELOPMENT AND IMPLEMENTATION OF CHALLENGE-BASED INSTRUCTION IN STATICS AND DYNAMICS

Robert Freeman, University of Texas, Pan American  
Horacio Vasquez, University of Texas, Pan American  
Arturo Fuentes, University of Texas, Pan American  
Martin Knecht, South Texas College  
Taylor Martin, University of Texas, Austin  
Joan Walker, Long Island University  
Araceli Ortiz, Tufts University

AC 2010-1696: ACTIVE LEARNING STRATEGIES TO ENHANCE LEARNING IN A CIVIL ENGINEERING GRADUATE VIBRATIONS COURSE

Luciana Barroso, Texas A&M University

AC 2010-749: M-MODEL: AN ONLINE TOOL FOR PROMOTING STUDENT PROBLEM SOLVING UTILIZING MENTAL MODELS

Edward Anderson, Texas Tech University  
Roman Taraban, Texas Tech University

**Tuesday, June 22, 2010**

**2166: Improving Mechanics & Structural Modeling Courses**

7:00-8:15 a.m. Kentucky International Convention Center, L9

**Moderator(s):** Pradip Sagdeo, Pfizer, Inc.

**Division(s):** Mechanical Engineering Division, Mechanics Division

This session, co-sponsored by the Mechanics Division, examines improvements in instructional methods for Mechanics of Materials and Structural Modeling courses.

AC 2010-710: UNCERTAINTY ANALYSIS AND INSTRUMENT SELECTION USING A WEB-BASED VIRTUAL EXPERIMENT

Praveen Malali, Old Dominion University  
Pooja Bais, Old Dominion University  
Robert Choate, Western Kentucky University  
Sushil Chaturvedi, Old Dominion University

AC 2010-1647: A CROSS CURRICULAR NUMERICAL AND EXPERIMENTAL STUDY IN HEAT TRANSFER

Timothy Doughty, University of Portland  
Steven O'Halloran, University of Portland

AC 2010-1666: EXPANDED USE OF DISCONTINUITY AND SINGULARITY FUNCTIONS IN MECHANICS

Robert Soutas-Little, Michigan State University

AC 2010-2146: TEACHING ENGINEERING REASONING USING A BEAM DEFLECTION LAB

Natasha Smith, University of Southern Indiana

AC 2010-1331: THE HYREV PROPULSION SYSTEM: A B20 POWER-SPLIT EXTENDED RANGE ELECTRIC VEHICLE FOR THE ECOCAR CHALLENGE

Vincent Sabatini, Embry-Riddle Aeronautical Univ., Daytona Beach  
Ryle Maxson, Embry-Riddle Aeronautical University  
Darris White, Embry-Riddle Aeronautical University  
Jack McKisson, Embry-Riddle Aeronautical University  
William Haupfear, Embry-Riddle Aeronautical University

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**2268: Teaching Dynamics**

8:30-10:15am, Kentucky International Convention Center, 207

**Moderator(s):** Shahnam Navaee, Georgia Southern University; Christopher Papadopoulos, University of Puerto Rico, Mayagüez

**Division(s):** Mechanics Division, Mechanical Engineering Division

This session will focus on innovations in the teaching of Dynamics.

AC 2010-1367: DYNAMICS BUZZWORD BINGO: ACTIVE/COLLABORATIVE/INDUCTIVE LEARNING, MODEL ELICITING ACTIVITIES, AND CONCEPTUAL UNDERSTANDING

Brian Self, California Polytechnic State University

James Widmann, California Polytechnic State University

AC 2010-832: USING THE DYNAMICS CONCEPTS INVENTORY AS A CONTINUOUS PROCESS IMPROVEMENT METRIC FOR IMPROVING STUDENT LEARNING OUTCOMES

J. Shelley, United States Air Force

AC 2010-360: MOVE IT - LEARNING MODULES FOR DYNAMIC SYSTEMS

Benson Tongue, University of California, Berkeley

Daniel Kawano, University of California, Berkeley

AC 2010-845: INTEGRATED DYNAMICS AND STATICS FOR FIRST SEMESTER SOPHOMORES IN MECHANICAL ENGINEERING

Sherrill Biggers, Clemson University

Marisa Orr, Clemson University

AC 2010-269: USING MICROSOFT WINDOWS TO COMPARE THE ENERGY DISSIPATED BY OLD AND NEW TENNIS BALLS

Josue Njock-Libii, Indiana University-Purdue University, Fort Wayne

AC 2010-1069: FOUR FREE-VIBRATION LABORATORY EXPERIMENTS USING TWO LUMPED MASS APPARATUSES WITH RESEARCH CALIBER ACCELEROMETERS AND ANALYZER

Richard Ruhala, Southern Polytechnic State University

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**2468: Teaching Statics**

12:30-2:00pm, Kentucky International Convention Center, 102

**Moderator(s):** Luciana Barroso, Texas A&M University; N.M. Hossain, Eastern Washington University

**Division(s):** Mechanics Division, Mechanical Engineering Division

This session will focus on innovations in the teaching of Statics.

AC 2010-2131: USING FILL-IN WORKSHEETS IN MECHANICS CLASSES

Rungun Nathan, Pennsylvania State University, Berks

AC 2010-2422: INTEL: PRESENTING REALISTIC EXERCISES IN A STATICS CLASS

Christine Valle, Georgia Institute of Technology

Sue Rosser, Georgia Institute of Technology

Janet Murray, Georgia Institute of Technology

Wendy Newstetter, Georgia Institute of Technology

Laurence Jacobs, Georgia Institute of Technology

AC 2010-900: SOURCES OF STUDENTS' DIFFICULTIES WITH COUPLES AND MOMENTS IN STATICS

Lucas Passmore, Pennsylvania State University-Altoona College

Thomas Litzinger, Pennsylvania State University

Christine B. Masters, Pennsylvania State University

Stephen Turns, Pennsylvania State University

Peggy Van Meter, Pennsylvania State University

Carla Firetto, Pennsylvania State University

Sarah Zappe, Pennsylvania State University

AC 2010-744: USING A DIGITAL DASHBOARD FOR LEARNING TO BLEND INTERACTIVE, WEB-BASED COURSEWARE INTO AN INSTRUCTOR-LED STATICS COURSE

Anna Dollar, Miami University

Paul Steif, Carnegie Mellon University

AC 2010-1868: IMPLEMENTING AN INVERTED CLASSROOM MODEL IN ENGINEERING STATICS: INITIAL RESULTS

Christopher Papadopoulos, University of Puerto Rico, Mayagüez

Aidsa Santiago Roman, University of Puerto Rico, Mayagüez

AC 2010-610: EMPORIUM BASED REDESIGN OF STATICS: AN INNOVATIVE APPROACH TO ENHANCE LEARNING AND REDUCE COSTS

Masoud Rais-Rohani, Mississippi State University

Andrew Walters, Mississippi State University

Anthony Vizzini, Western Michigan University

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**2566: Trends in Mechanical Engineering I**

2:15-4:00 p.m. Kentucky International Convention Center, L9

**Moderator(s):** Nicholas Roberts, Vanderbilt University

**Division(s):** Mechanical Engineering Division, Mechanics Division

This session, co-sponsored by the Mechanics Division, is the first in the series which examines innovative methods to promote interest and research activity integration into mechanical engineering curriculum.

AC 2010-35: COMBINED BS/MS PROGRAMS IN MECHANICAL ENGINEERING: A BENCHMARK STUDY

Christine Valle, Georgia Institute of Technology

Wayne Whiteman, Georgia Institute of Technology

AC 2010-279: AN INTERDISCIPLINARY UNDERGRADUATE COURSE BRIDGING THE GAPS BETWEEN ENGINEERING, SCIENCE AND THE ARTS

Yunfeng Wang, The College of New Jersey

Christopher Ault, The College of New Jersey

Teresa Nakra, The College of New Jersey

Andrea Salgian, The College of New Jersey

Meredith Stone, Independent Evaluator

AC 2010-326: TOWARDS MORE EFFICIENT PRACTICES AND METHODS FOR ABET ACCREDITATION

Ivana Milanovic, University of Hartford

Tom Eppes, University of Hartford

AC 2010-430: EVALUATION OF REDESIGNED PARTS CONSIDERING ANALYSIS, PRODUCTION AND DISTRIBUTION FACTORS

Jorge Rodriguez, Western Michigan University

Alamgir Choudhury, Western Michigan University

AC 2010-702: BOLOGNA PROCESS – IT'S TIME FOR A LOOK BACK: A MECHANICAL ENGINEERING CASE

Joao Vinhas, Politecnico de Viseu

Joao Paiva, Politecnico de Viseu

AC 2010-986: HYBRID COURSE FORMAT FOR PROJECTS IN ROBOTICS

Hakan Gurocak, Washington State University, Vancouver

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**2668: Mechanics Division Poster Session**

4:30-6:00 p.m. Kentucky International Convention Center, Division Poster Session 28, Exhibit Hall 2C & 2D

**Moderator(s):** Mechanics Division

**Division(s):** Mechanics Division

This is the poster session for the Mechanics Division

AC 2010-2387: ASSESSMENT OF BOUSSINESQ APPROXIMATION IN A FLUID MECHANICS COURSE

Mysore Narayanan, Miami University

AC 2010-480: QUALITY ENHANCEMENT IN STATICS

Thomas Rockaway, University of Louisville

D. Joseph Hagerty, University of Louisville

AC 2010-1706: STUDIES ON STRESS CONCENTRATION USING EXPERIMENTAL AND NUMERICAL METHODS

Somnath Chattopadhyay, Pennsylvania State University

Rajesh Kitey, Indian Institute of Technology Kanpur

AC 2010-1310: COMPOSITES IN UNDERGRADUATE EDUCATION: AN IMPROVED UNDERSTANDING OF MECHANICS

Timothy Hodges, Virginia Military Institute

Jon-Michael Hardin, Virginia Military Institute

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**2768: Mechanics Division Awards Banquet**

6:30 p.m.-9:00 pm Offsite: CQ Princess Cruise, 4<sup>th</sup> Street Wharf, Louisville, KY

**Moderator(s):** Gary L. Gray, Pennsylvania State University

**Division(s):** Mechanics Division

The Mechanics Division Annual Awards Banquet is a Ticketed off-site social event. Cost: \$75 advanced. See inset for further details.

**Wednesday, June 23, 2010**

**3468: Mechanics Division Business Meeting**

12:30-2:00 p.m. Kentucky International Convention Center, 211

**Moderator(s):** Gary L. Gray, Pennsylvania State University

**Division(s):** Mechanics Division

Annual Business Meeting of the Mechanics Division. All are welcome to attend.

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**3566: Teaching Mechanical Systems: What's New**

2:15-4:00 p.m. Kentucky International Convention Center, 108

**Moderator(s):** Timothy Hodges, Virginia Military Institute

**Division(s):** Mechanical Engineering Division, Mechanics Division

This session, co-sponsored by the Mechanics Division, reviews pedagogical innovation in mechanical systems.

AC 2010-485: VISUALIZED PHOTOSTRESS IMAGES FOR STRESS CONCENTRATION INSTRUCTION

Nashwan Younis, Indiana University-Purdue University, Fort Wayne

AC 2010-130: THE MILITARY TANK – AN EXAMPLE FOR RIGID BODY KINEMATICS

Joseph Walchko, United States Military Academy

AC 2010-512: HOW DOES IT WORK? USING TOYS TO INSPIRE WONDER AND DEVELOP CRITICAL THINKING SKILLS IN FLUIDS MECHANICS

Camilla Saviz, University of the Pacific

Said Shakerin, University of the Pacific

AC 2010-2210: EVALUATION OF RAPID DEVELOPMENT SYSTEM USING EYE TRACKER

Arun Chintalapati, Missouri University of Science and Technology

Hong Sheng, Missouri University of Science and Technology

Richard Hall, Missouri University of Science and Technology

Robert Landers, Missouri University of Science and Technology

AC 2010-1369: USE OF MULTIMEDIA CASE STUDIES IN AN INTRODUCTORY COURSE IN MECHANICAL ENGINEERING

Ashok Kumar Manoharan, Auburn University  
P.K. Raju, Auburn University  
Chetan Sankar, Auburn University

AC 2010-1006: TEACHING AND ASSESSMENT EXPERIENCES OF AN UNDERGRADUATE MECHANICAL ENGINEERING  
DESIGN COURSE

Raghu Echempati, Kettering University  
Richard Dippery, Kettering University

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**2008/2009 MECHANICS DIVISION OFFICERS**

<b>Chair:</b>	Gary L. Gray, Penn State University (814) 863-1778, gray@enr.psu.edu
<b>Past Chair:</b>	Benson H. Tongue, University of California, Berkeley (510) 643-8629, bhtongue@me.berkeley.edu
<b>Program Chair:</b>	Anna Dollár, Miami University (513) 529 - 1875, dollara@muohio.edu
<b>Program Chair Elect:</b>	Jon-Michael Hardin, Virginia Military Institute (540) 464-7308, hardinj@vmi.edu
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<b>Treasurer:</b>	Laura Ruhala, Southern Polytechnic State University
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<b>Executive Committee Members:</b>	Nashwan Younis, Indiana University-Fort Wayne (260) 481-6887, younis@enr.ipfw.edu David Myszka, University of Dayton (937) 229-2968, dmyska@udayton.edu Tom Nordenholz, California Maritime Academy (707) 654-1114, tnordenholz@csum.edu Eric Bell, Triton College (708) 456-0300 x3349, ebell@triton.edu Luciana Barroso (979) 845-0290, lbarroso@civil.tamu.edu