CONTENTS

ENGINEERING EDUCATION AND PROFESSIONAL DEVELOPMENT

CURRICULUM INNOVATIONS, PEDAGOGY AND LEARNING METHODOLOGIES

IMECE2011-62081 ................................................................. 1
Challenges and Methods in Better Teaching of Engineering
  Samir Mekid

IMECE2011-62229 ................................................................. 7
Breaking Down Classroom Walls: Fostering Improved Communication and Relations
Between Engineers and Tradesmen Through a Joint Semester Project
  Michael W. Martin and Cale T. Polkinghorne

IMECE2011-62238 ................................................................. 15
A Model Curriculum for Creativity Instruction Integrated Into the Bachelor Program of
Engineering Professional Development
  Varghese Panthalookaran

IMECE2011-62491 ................................................................. 21
Hardware Demonstration of Classical Undergraduate Control Design Methods Using
MATLAB Real-Time Windows Target Environment
  Eniko T. Enikov, Vasco Polyzoev, and Joshua Gill

IMECE2011-62602 ................................................................. 29
Features of a Trust Model for a Complex System
  Simin Hall, William McQuay, and Eric Vance

IMECE2011-62697 ................................................................. 41
A Case Study of Using Capstone Design as Basis for Curriculum-Wide
Project-Based Learning
  Barry Hyman, Sanjeev Khanna, Yuyi Lin, and Jim Borgford-Parnell

IMECE2011-62729 ................................................................. 47
Project-Based Service-Learning and Student Motivation
  Lauren A. Cooper, Daria Kotys-Schwartz, and Derek T. Reamon

IMECE2011-62736 ................................................................. 55
Design Experience in a Sophomore Mechanics and Machines Course
  Wael Mokhtar

IMECE2011-63087 ................................................................. 63
Sample Biomedical Projects Carried Out by Undergraduate Mechanical
Engineering Students
  Kathleen C. Lifer, Jason S. VanAtta, Judson M. Bauman, Jed E. Marquart, and Hui Shen
<table>
<thead>
<tr>
<th>Conference ID</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMECE2011-63099</td>
<td>Graphical Interpretation of Exergy</td>
<td>Daisie D. Boettner, James Bluman, Matthew Rowland, Jonathan Bodenhamer, and A. Özer Arnas</td>
</tr>
<tr>
<td>IMECE2011-63807</td>
<td>Panther Peer: A Web-Based Tool for Peer and Self Evaluation</td>
<td>Venkatesh Venkataramanujam and Pierre Larochelle</td>
</tr>
<tr>
<td>IMECE2011-63912</td>
<td>Implementation of a New Freshman Year Interdisciplinary Course Sequence</td>
<td>Sung-Hwan Joo and Chris Pung</td>
</tr>
<tr>
<td>IMECE2011-63933</td>
<td>Assessing Team Conflict in Student Design Teams</td>
<td>Xaver Neumeyer and Ann F. McKenna</td>
</tr>
<tr>
<td>IMECE2011-63987</td>
<td>Use of Multiple Choice Questions as an Assessment Tool in Dynamics</td>
<td>Amitabha Ghosh</td>
</tr>
<tr>
<td>IMECE2011-64169</td>
<td>Teaching Microcontroller Programming Graphically</td>
<td>John R. Rogers and Konstantin Avdashchenko</td>
</tr>
<tr>
<td>IMECE2011-65244</td>
<td>Biomedical Engineering Design Education at King Saud University:</td>
<td>Harcharan Singh Ranu and Aman Sweet Bhullar</td>
</tr>
<tr>
<td>IMECE2011-65333</td>
<td>Incorporation of Manufacturing Process Design Into the Senior Capstone Design Course</td>
<td>Douglas V. Gallagher and Ronald A. L. Rorrer</td>
</tr>
<tr>
<td>IMECE2011-65392</td>
<td>Conversion of a Dune Buggy to a Hybrid Vehicle as a Systems Design Course Project</td>
<td>Emin Yilmaz</td>
</tr>
<tr>
<td></td>
<td>DISTANCE/ONLINE ENGINEERING EDUCATION, MODELS AND ENABLING TECHNOLOGIES</td>
<td></td>
</tr>
<tr>
<td>IMECE2011-63598</td>
<td>Utilization of Instructional Technology for Development of Web-Based Mechanical Engineering Courses</td>
<td>Shanzhong (Shawn) Duan and Kurt Bassett</td>
</tr>
<tr>
<td>IMECE2011-63743</td>
<td>Overcoming the Limitations of Current Online Laboratory Systems Using Game-Based Virtual Environments</td>
<td>Yizhe Chang, El-Sayed Aziz, Sven K. Esche, and Constantin Chassapis</td>
</tr>
</tbody>
</table>
IMECE2011-63746 .......................................................... 169
Our First Online Offering of Introduction to Thermal-Fluid Engineering

Simin Hall, Clint Dancey, Catherine T. Amelink, and Samuel Conn

IMECE2011-63783 .......................................................... 177
Development of a “S.M.A.R.T.” Assessment System for Accreditation and Continuous
Program Improvement

Swami Karunamoorthy

ETHICS AND PROFESSIONALISM INTEGRATION IN THE
ENGINEERING CURRICULUM
IMECE2011-63161 .......................................................... 183
The Interest of Mechanical Engineering Students in the Grand Challenges for Engineering
in the 21ST Century

Christine Hailey, Michael Drysdale, and Daniel Householder

IMECE2011-63558 .......................................................... 191
Preparation for the Fundamentals of Engineering Examination at Virginia Tech

David A. Dillard, Melissa D. Nipper, Scott W. Case, and Alan A. Kornhauser

IMECE2011-64975 .......................................................... 199
Integration of Climate Change in the Analysis and Design of Engineered Systems:
Barriers and Opportunities for Engineering Education

Juan Lucena, Jason Delborne, Katie Johnson, Jon Leydens, Junko Munakata-Marr, and
Jen Schneider

IMECE2011-65710 .......................................................... 207
Levels of Ethics Education in University Graduate Programs

Austin Filush and Nael Barakat

FLUID MECHANICS, HEAT TRANSFER, EXPERIMENTS AND
ENERGY SYSTEMS
IMECE2011-62217 .......................................................... 213
A Model Wind Turbine Design-Build-Test Project

Scott Post and Curtis Boirum

IMECE2011-62218 .......................................................... 219
Oil Spill Cleanup Project

Scott Post

IMECE2011-62371 .......................................................... 227
Characterization of Air-Entrainment in a Plunging Water Jet System Using
Image Processing: An Educational Approach

Arman Molki, Lyes Khezzar, and Afshin Goharzadeh
<table>
<thead>
<tr>
<th>Conference Paper</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMECE2011-63699</td>
<td>A Solar-Powered Direct Steam Generation Boiler for an Educational Desktop Rankine Cycle</td>
<td>Ximena Toro, Marc Compere, Bernard Van Wie, and Birce Dikici</td>
</tr>
<tr>
<td>IMECE2011-63806</td>
<td>Reciprocating Steam Turns 300</td>
<td>Matthew A. Carr</td>
</tr>
<tr>
<td>IMECE2011-64892</td>
<td>Molecular Dynamic Computer Simulation Models for Teaching Thermodynamic Principles</td>
<td>W. John Dartnall and John A. Reizes</td>
</tr>
<tr>
<td>IMECE2011-65030</td>
<td>Design of Experiment to Evaluate Thermal Resistance of a PTAC Unit</td>
<td>J. C. Leylegian, M. H. Naraghi, S. Montoni, M. Kaszczak, Jr., and V. Garafolo</td>
</tr>
<tr>
<td>IMECE2011-65303</td>
<td>Getting Hands-On Experience From Simple Experiments and Model Development in Thermal-Fluid Courses</td>
<td>Xianchang Li and Jiang Zhou</td>
</tr>
<tr>
<td>IMECE2011-65485</td>
<td>An Examination of the Behavior of Thermodynamic Properties in the Compressed Liquid Region</td>
<td>Amir Karimi, Randall D. Manteufel, and Kelly Mulligan</td>
</tr>
<tr>
<td><strong>NANOTECHNOLOGY IN MECHANICAL ENGINEERING EDUCATION, CURRICULUM, AND LABORATORY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMECE2011-62598</td>
<td>Incorporation of Hands-On Activities in Learning Nanomaterials</td>
<td>Lihong (Heidi) Jiao and Nael Barakat</td>
</tr>
<tr>
<td><strong>PRE-COLLEGE (K-12) STEM-UNIVERSITY, SCHOOL AND INDUSTRY ALLIANCE (USIA)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IMECE2011-62187</td>
<td>CAPSULE: An Innovative Capstone-Based Pedagogical Approach to Engage High School Students in STEM Learning</td>
<td>Abe Zeid, Sagar Kamarthi, Claire Duggan, and Jessica Chin</td>
</tr>
<tr>
<td>IMECE2011-64164</td>
<td>Best Practices in Student Section Participation and Professional Development</td>
<td>Mary Kathryn Jones, Kelsey N. Dunn, Jill R. Hershman, Alston H. Pike, Sarah E. Johnson, and Beth A. Todd</td>
</tr>
</tbody>
</table>
Creating an Interactive Light Studio for the American Sign Language and English Lower School
  Melody Baglione, Nicholas Wong, Hannah Clevenson, Bridget O'Meara, and James Baker

Incorporating Biomechanical Research Topics Into K-12 Classroom Design Projects to Broaden Participation and Increase Engineering Interest
  Brandi N. Briggs, Benjamin S. Terry, Janet Yowell, and Stephanie Rivale

PROBLEM SOLVING IN ENGINEERING EDUCATION, DESIGN, AND PRACTICE

  Zbigniew M. Bzymek

Benefits of Lean Teaching
  Franz-Josef Kahlen, Shannon Flumerfelt, Anna Bella Siribang-Manalang, and Anabela Alves

Optimal Angle of Inclination for Fixed Solar Panels/Collectors
  Mehmet Sozen and Jacob Griffin

Teaching Formulation Skills in an Upper Level Fluid Mechanics Course
  Amitabha Ghosh

A Product Realization Approach to Creativity in Engineering Education
  Mohamed E. M. El-Sayed and Jacqueline A. J. El-Sayed

Problem Solving in Mechatronic Competency Training Related to Field Practice
  Andrzej B. Sierota, Grzegorz Klapyta, and Jerzy Gustowski

A Web Based "Virtual Racing Car Championship" to Teach Vehicle Dynamics and Multidisciplinary Design
  Francesco Biral, Fabrizio Zendri, Enrico Bertolazzi, Paolo Bosetti, Marco Galvani, Filippo Trivellato, and Mauro Da Lio

A Framework for Integrating Design Education, Research and Outreach: The Center for Innovation and Engineering at West Point
  Bruce Floersheim, J. Ledlie Klosky, and Matthew Flynn