DGS’ DESK

Hope everyone enjoyed their Easter Holiday! The end of the Spring semester is almost here, and with it a flurry of graduate student activity. Please join me in congratulating the successful PhD dissertation defenses for Tori Johnson, Ryan Nell, and Nicole Sund!!

All graduate students should have their respective Academic iNDex profiles up to date since we will be using the latter for your annual progress reports, most likely later this month.

Wishing everyone a great month of April and productive end to the semester!

Tony Simonetti, DGS

CONGRATULATIONS!

HOOORRAAYYY!!!! Maria Gibbs is this year’s winner of the 3MT Competition!! Maria’s winning 3MT video footage is up on both the ND 3MT and UQ3MT (University of Queensland) websites – the pertinent links are provided below.

http://threeminutethesis.org/3mt-showcase

http://3mt.nd.edu/meet-the-winners/

Our department and College of Engineering have bragging rights for one year – well done Maria!!
Lei Li (PhD graduate student) received the “Chinese Government Award for Outstanding Self-Financed Students Abroad”, which is associated with a $6000 award (http://www.csc.edu.cn/chuguo/s/567). This is an annual award from the China Scholarship Council, Chinese Department of Education, for excellent graduate students studying abroad. The award recognizes Lei’s work on “Topology optimization of innovative structures with linear and nonlinear non-local continuum theories”.

Lei Li began his graduate study in CPSSL group (http://www3.nd.edu/~cpssl/) during the summer of 2012. His research concentrates on the development of efficient dual sequential approximation optimization algorithms for topology optimization, bridging the advanced mechanical theories and the practical application of topology optimization technique. (advisor: Dr. Kapil Khandelwal)

ANNOUNCEMENTS

Fab Sabba was awarded grants from Reilly Center, ECI, NDenergy, Office of Sustainability at Notre Dame (total of $3,200) to host Greenhouse Gas Awareness Day @ Notre Dame.

Climate change is an environmental, social, and ethical issue. This problem has far reaching effects that are already changing everyday life across the globe. In response to this global challenge, Notre Dame is hosting a Greenhouse Gas Awareness Day, “GHG@ND.” During this day, we will examine the relationship between water and emissions, feature ongoing research projects, and discuss what we as individuals and as a community can do to combat greenhouse gas emissions.

GHG@ND will take place on Thursday, April 14th, 2016. The day is organized in different sessions, and these can be viewed on the promotional flyer – please see last page of this newsletter.

Cash prizes will be offered in a poster competition! If you wish to enter the poster completion or have questions, then please contact Fabrizio Sabba (fsabba@nd.edu) or Tessa Clarizio (tclarizi@nd.edu)

Conference Presentations


Fab Sabba is presenting a talk on April 5th, 2016 in Annecy (France) at the 5th IWA/WEF Wastewater Treatment Modelling Seminar 2016. The title of his talk is: "Predicting N₂O emissions from biofilm systems".

Academic Social Happy Hour

Another great event on the books. This month we decided not to cater the event on campus, and instead moved the post presentation social hour to Eddy Street Commons. The decision to have the event on a Friday made the event feel more relaxing with the week behind us. This month’s presentations were presented by Annie Mattingly from Dr. Shrout's group and Evan Gerbo from Dr. Thrall's group. Abstracts from their talks are listed below.

Andrew Schranck, Theresa Aragon (co-organizers)

Presenters for the Friday, March 18th, 2016 event were:

Anne Mattingly (PhD candidate): "Rhamnolipid-independent swarming motility in Pseudomonas aeruginosa"

Many bacterial pathogens use surface motility as a step in their colonization and initiation of new infections. One type of surface motility, swarming, occurs when flagellated bacteria coordinate to spread across a surface within a thin liquid film. For the opportunistic pathogen Pseudomonas aeruginosa, this group-dependent surface movement has been shown to require production of the surfactant rhamnolipid. However, we find that P. aeruginosa is capable of rhamnolipid-independent swarming when growing on glutamate and similar carbon sources, like citrate and succinate. My research currently focuses on secondary mutations in a rhamnolipid-independent parent (PAO1cΔrhlAB) that eliminate this effect in an effort to elucidate the mechanisms behind it. (advisor: Dr. Joshua Shrout)
Evan Gerbo (PhD candidate): “Alternative Configurations for Panelized Bridge Systems”

My presentation will focus on the expansion of deployable bridge technologies. The research aims to allow for a greater efficiency and diversity in panelized bridge systems, through the use of alternative forms. These panelized bridge systems are generally arranged in a beam-type configuration, through the use of forms such as trusses and arches these systems can achieve longer spans and higher load carrying capacities. I'll also briefly touch on how our lab is using Digital Image Correlation (DIC) to aid in this research. (advisor: Dr. Ashley Thrall)
Lei Li - Since its introduction, the topology optimization technique has found a large number of applications in early conceptual and preliminary design phases of structures where design changes significantly impact the performance of the final structure. However, most topology optimization studies in the literature are based on classical continuum theories which ignore the material microstructure effects on its macroscopic mechanical behavior. This assumption becomes invalid and leads to inaccurate structural response prediction when the length-scales of material micro- and macrostructure are comparable. Therefore, advanced theories need to be incorporated with topology optimization to obtain more reliable designs.

My current research is focused on topology optimization of linear and nonlinear structures with microstructural effects. As the key factor to optimization efficiency, I am developing new optimization algorithms based on dual sequential approximation framework. This preliminary work provides me insightful understanding of how topology optimization proceeds and how the material mechanics determines the final results. To include microstructural effects into the design process, I combine elasticity with microstructure and gradient elasticity theories with topology optimization. The topologies from these two theories show prominent length-scale effects with large length-scale parameter. My newest idea in this field is to introduce material damage into topology optimization formulation with microstructural effect based on micropolar continuum theory. The results obtained from this research can give us a better understanding of how to design damage-resilient structures. (advisor: Dr. Kapil Khandelwal)
The Kinetic Structures Laboratory (KSL), the research group directed by Dr. Ashley P. Thrall, includes PhD students Rob Devine, Evan Gerbo, Alexis Tugilimana, Mirela Tumbeva, and Yao Wang, and Steve Barbachyn, and undergraduate students Max Ducey and Madalyn Sowar. The KSL is devoted to analytically, numerically, and experimentally investigating the behavior of a wide variety of moving, modular, and deploying structures. Applications include military operations, disaster relief, and modular construction. For example, the KSL developed a novel deployable origami shelter with integrated energy planning and management. This research was motivated by the rising priority for reducing fuel consumption for heating and cooling military shelters. To address this need, the KSL has designed, optimized, and experimentally tested a concept for a folding, rigid wall structure inspired by the art of origami. Ongoing research efforts are focusing on the development of novel adjustable steel bridge connections and adjustable steel bridge modules for rapidly erection of structural systems. Experimental testing and detailed numerical modeling of these concepts are currently being performed. Valuable industry feedback is being provided by Ted Zoli of HNTB Corporation on this work. In collaboration with Dr. Rajan Filomeno Coelho at the Université Libre de Bruxelles, research is also being performed on topology optimization of lightweight modular structures under uncertainties. A new project involves innovative research that offers the promise of dramatically reduced field construction times and fabrication costs for reinforced concrete nuclear structures through: 1) high-strength steel deformed reinforcing bars (rebar); 2) prefabricated rebar assemblies with headed anchors; and 3) high-performance concrete. This research is in collaboration with Dr. Yahya Kurama, Sandia National Laboratories, and AECOM. Research being conducted within the Thrall research group is currently funded with support from the National Science Foundation, the Department of Energy, and Fond National de la Recherche Scientifique (FNRS, Belgium), with prior support from the US Army Natick Soldier Research Development and Engineering Center.
More information on the Kinetic Structures Laboratory and a list of publications can be found at the following website: [www.nd.edu/~athrall](http://www.nd.edu/~athrall)

**THE GRADUATE SCHOOL – SCHEDULE OF DEADLINES**

<table>
<thead>
<tr>
<th>Event</th>
<th>Fall 2015</th>
<th>Spring 2016</th>
<th>Summer 2016</th>
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</thead>
<tbody>
<tr>
<td>Teaching assistant list submitted to Graduate School</td>
<td>Aug. 14</td>
<td>Dec. 4</td>
<td>—</td>
</tr>
<tr>
<td>First class day</td>
<td>Aug. 25</td>
<td>Jan. 12</td>
<td>Jun. 13</td>
</tr>
<tr>
<td>All course changes</td>
<td>Sept. 1</td>
<td>Jan. 19</td>
<td>—</td>
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<tr>
<td>Initial graduation list available in GradAdmin (Registrar)</td>
<td>Sept. 8</td>
<td>Jan. 26</td>
<td>June 21</td>
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<tr>
<td>Fall/Spring break begins</td>
<td>Oct. 17</td>
<td>Mar. 5</td>
<td>—</td>
</tr>
<tr>
<td>Course discontinuance</td>
<td>Oct. 30</td>
<td>Mar. 18</td>
<td>—</td>
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<tr>
<td>Preliminary theses/dissertations submitted for formatting check*</td>
<td>Nov. 9</td>
<td>Mar. 14</td>
<td>Jun. 20</td>
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<tr>
<td>Thanksgiving break begins (Wed. – Sun.)</td>
<td>Nov. 25</td>
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<tr>
<td>Easter break begins (Fri. – Mon.)</td>
<td>—</td>
<td>Mar. 25</td>
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<tr>
<td><strong>Master's comprehensive examinations &amp; PhD dissertation defenses</strong></td>
<td>Nov. 30</td>
<td>Apr. 8</td>
<td>Jul. 11</td>
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<tr>
<td>All admission to candidacy forms submitted to Graduate School</td>
<td>Dec. 7</td>
<td>Apr. 15</td>
<td>Jul. 18</td>
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<tr>
<td>Final theses/dissertations submitted to Graduate School</td>
<td>Dec. 7</td>
<td>Apr. 15</td>
<td>Jul. 18</td>
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<tr>
<td>Last class day</td>
<td>Dec. 10</td>
<td>Apr. 27</td>
<td>Jul. 22</td>
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<tr>
<td>Final exams begin</td>
<td>Dec. 14</td>
<td>May 2</td>
<td>—</td>
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<tr>
<td>Graduation date (official degree conferral)</td>
<td>Jan. 3</td>
<td>May 14</td>
<td>Jul. 31</td>
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*Formatting checks should be submitted to the Graduate School when the document is given to readers, at least two to four weeks prior to the defense.*
FELLOWSHIP/SCHOLARSHIP/EMPLOYMENT OPPORTUNITIES

- Harriet Evelyn Wallace Scholarship
  http://www.americangeosciences.org/workforce/harriet-evelyn-wallace-scholarship

- L’ORÉAL USA FOR WOMEN IN SCIENCE PROGRAM
  http://www.lorealusa.com/Foundation/Article.aspx?topcode=Foundation_AccessibleScience_Fellowships

- The Smithsonian Institution Fellowship Program (Deadline: September 1st, 2016)
  http://www.smithsonianofi.com/fellowship-opportunities/smithsonian-institution-fellowship-program/

NEWSLETTER CONTACTS

If you wish to include or contribute news items for the next issue of the newsletter, please contact one of the editorial members below:

Ryan Alberdi, PhD candidate, Ryan.A.Alberdi.1@nd.edu
David Burney, PhD candidate, David.C.Burney.2@nd.edu
Andrew Schranck, PhD candidate, aschran@nd.edu
Mollie Dash, Department Administrator, dash.1@nd.edu
Antonio Simonetti, Associate Professor & DGS, simonetti.3@nd.edu
8:30 - 9:00 Breakfast and Opening Remarks
Fabrizio Sabba, Ph.D. Candidate, CEEES; Tessa Clarizio, Undergrad, CEEES
Free reusable Starbucks cups will be given to attendees - coffee & bagels provided. The first 25 participants will get a free GHG@ND T-shirt.

9:00 - 10:30 “Water and Greenhouse Gas Emissions Nexus”
featuring Dr. Robert Nerenberg, Associate Professor CEEES; Dr. Jen Tank, Associate Professor of Biological Sciences; Dr. Kyle Doudrick, Assistant Professor CEEES

11:00 - 1:00 Energy and Environment
Student Poster Competition
Monetary prizes will be announced during closing remarks. Pizza and beverages provided.

3:00 - 4:00 “Act Now: Plans to Reduce Greenhouse Gas Emissions”
featuring Tessa Clarizio, GreenND; Mark Hummel, Notre Dame Assistant Director of Utilities; Therese Dorau, Director of the South Bend Office of Sustainability

4:00 - 5:00 Sustainability Jeopardy
Pizza and beverages provided. The first 25 participants will get a free GHG@ND T-shirt and have a chance to win a Bookstore gift card. Come try our blender bike and make your environmental friendly smoothie!

5:00 - 5:15 Closing remarks and poster winners announcements