

HANA O KE KAI

“Work of the Ocean”

NEWSLETTER OF THE OCEAN AND RESOURCES ENGINEERING DEPARTMENT, Spring 2014, Volume 17, Issue 2

Chair’s Message

Bruce M. Howe, Chair



We had a big round of graduating MS students this term – five. Best wishes in your new endeavors! One MS and two PhD students enrolled this spring semester; next semester we are expecting four new MS students.

This summer we (Prof. Huang with Prof. Merrifield in Oceanography, myself, and many others) expect to bring the cabled Kilo Nalu Observatory back into operation. This will be a valuable asset for use in the ORE lab class, for research purposes, and for outreach. Feel free to volunteer for fieldwork!

The frustrating lack of success in finding the wreckage of flight MH370 and the loss of ROV *Nereus*, apparently due to implosion of buoyancy spheres, highlight the continuing challenges – and opportunities – of exploring the deep ocean.

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Editor’s Corner

Jonathan Koons, TA



It’s been a good year, and a lot of that is due to the quality of the people that are involved in every different facet of this program. I want to thank everyone at ORE.

Also, thank you to everyone that contributed to the newsletter. You made this easier for me. As for the participants in the “game show,” you made it fun.

I hope you enjoy this edition of Hana O Ke Kai...

Student and Faculty News

- **William Templeton** defended his MS Plan A Thesis “Tsunami Hazard Assessment of American Samoa” on January 24, 2014.
- **Andrew Schwartz** defended his MS Plan B Presentation “Coupled Dynamics of a 5 MW OTEC Platform and Coldwater Pipe” on April 22, 2014.
- **Shino Mikayita** defended her MS Plan B Presentation “Effect of the Properties of Porous Media on Hydrate Stability.” on April 30, 2014.
- **Michael Frederick** defended his MS Plan B Presentation “Hydrodynamic Modeling of Pelamis® PI-750 Wave Energy Converters using WAMIT™ Software” on April 30, 2014.
- **Allan Carmichael** defended his MS Plan B Presentation “Experimental Evaluation of Jet Assisted Trenching in Submerged Compacted Sand” on May 8, 2014
- **Eva-Marie Nosal** was awarded tenure and promoted to Associate Professor
- **Gerard Nihous** was awarded tenure.

Some Recent ORE Publications

Carter, R.W. and Ertekin, R.C. (2014), "Focusing of Wave-Induced Flow through a Submerged Disk with a Tubular Opening," *Applied Ocean Research*, Vol. 47, August, pp. 110-124, DOI: 10.1016/j.apor.2014.04.002.

Ertekin, R.C., Hayatdavoodi, M. and Kim, J.W. (2014) "On Some Solitary and Cnoidal Wave Diffraction Solutions of the Green-Naghdi Equations," *Applied Ocean Research*, Vol. 47, August, pp. 125-137, DOI: 10.1016/j.apor.2014.04.005.

Korde, U. A. and **Ertekin, R.C.** (2014) "On wave energy focusing and conversion in open water," *Renewable Energy - An International Journal*, Vol. 62, February, pp. 84-99. DOI: 10.1016/j.renene.2013.06.033

Zhao, B.B., Duan, W.Y. and **Ertekin, R.C.** (2014), "Application of Higher-Level GN Theory to some Wave Transformation Problems," *Coastal Engineering*, Vol. 83, January, pp. 177-189. DOI: 10.1016/j.coastaleng.2013.10.010

Ertekin, R.C. and Xia, D. (2014), "Hydroelastic response of a floating runway to cnoidal waves," *Physics of Fluids*, AIP, Vol., 26, No. 2, February, pp. 027101-1 to 0127101-16. DOI: 10.1063/1.4862916

Nolte, J. and Ertekin, R.C. (2014), "Wave Power Calculations for a Wave Energy Conversion Device Connected to a Drogue," *J. of Renewable and Sustainable Energy*, AIP, Vol. 6, No. 1, pp. 013117-1 to 013117-21. DOI: 10.1063/1.4862785

Seiffert, B., Hayatdavoodi, M. and Ertekin, R.C. (2014), "Experiments and Computations of Solitary-Wave Forces on a Coastal-Bridge Deck. Part I: Flat Plate," *Coastal Engineering*, Vol. 88, June, DOI: 10.1016/j.coastaleng.2014.01.005

Hayatdavoodi, M., Seiffert, B. and Ertekin, R.C. (2014), "Experiments and Computations of Solitary-Wave Forces on a Coastal-Bridge Deck. Part II: Plate with Girders," *Coastal Engineering*, Vol. 88, June, DOI: 10.1016/j.coastaleng.2014.02.007

Korde, U. and **Ertekin, R.C.** (2014), "Near-optimal time-domain control of small buoys in irregular waves," *Proc. 33th Int. Conf. on Ocean, Offshore and Arctic Engineering*, OMAE '14, ASME, June 8-13, San Francisco, OMAE2014-24570, 7pp.

Seiffert, B., Ertekin, R.C. and Robertson, I.N. (2014), "Experimental investigation on the role of entrapped air on solitary wave forces on a coastal bridge deck," *Proc. 33th Int. Conf. on Ocean, Offshore and Arctic Engineering*, OMAE '14, ASME, June 8-13, San Francisco, OMAE2014-24571, 8pp.

Hayatdavoodi, M. and Ertekin, R.C. (2014), "A Comparative Study of Nonlinear Shallow-Water Wave Loads on a Submerged Horizontal Box," *Proc. 33th Int. Conf. on Ocean, Offshore and Arctic Engineering*, OMAE '14, ASME, June 8-13, San Francisco, OMAE2014-24572, 11pp.

Korde, U. A. and **Ertekin, R.C.** (2014) "Control strategies for small buoys equipped for wave energy generation," *Proc. 10th ONR/MTS Buoy Workshop*, March 3-6, San Diego, CA.

Continued on page 3

Publications & Events

Recent ORE Publications... continued from page 2

Nolte, J., Ertekin, R.C. and Davis, E.P. (2014) "In-ocean experiments of a wave energy conversion device when moored to an anchor and to a drogue with wave power calculations and optimizations," *Proc. 10th ONR/MTS Buoy Workshop*, March 3-6, San Diego, CA.

Zhao, B.B., Duan, W.Y., **Ertekin, R.C.** and Webster, W.C. (2014), "Recent progress on the GN equations for a two-layer flow", *Proc. 29th Intl. Workshop on Water Waves and Floating Bodies*, Osaka, March 30-April 02

Stopa, J.E. and **Cheung, K.F.** (2014). Intercomparison of wind and wave data from the ECMWF Reanalysis Interim and NCEP Climate Forecast System Reanalysis. *Ocean Modelling*, 75, 65-83.

Song, H. C., **B. M. Howe**, M. G. Brown, and R. K. Andrew, Diversity-based acoustic communication with a glider in deep water, *J. Acoust. Soc. Am. Express Letters*, 135, 1023–1026, (2014), DOI:<http://dx.doi.org/10.1121/1.4864299>

He, F., **Huang, Z.**, Hydrodynamic performance of pile-supported OWC-type structures as breakwaters: An experimental study. *Ocean Eng.* (2014), <http://dx.doi.org/10.1016/j.oceaneng.2014.04.023>

Deng, Z.Z., **Huang, Z.**, Law, A.W.K. (2014). Wave power extraction from a bottom-mounted oscillating water column converter with a V-shaped channel. *Proc. R. Soc. A470*: 20140074. <http://dx.doi.org/10.1098/>

Upcoming Meetings and Conferences

33rd International Conference on Ocean, Offshore and Arctic Engineering (OMAE2014) in San Francisco, California June 8-13, 2014. <http://asmeconferences.org/omae2014/>



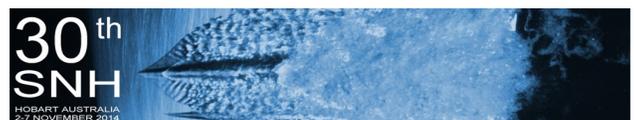
OCEANS'14 MTS/IEEE Conference in St. John's, Newfoundland, Canada September 14-19, 2014. <http://www.oceans14mtsiceestjohns.org/>



24th International Offshore (Ocean) and Polar Engineering Conference will be held in Busan, Korea June 15-20, 2014. <http://www.isopec2014.org>



30th Symposium on Naval Hydrodynamics will be held in Hobart, Australia November 2-7, 2014. <http://www.30navalhydrodynamics.com/>



The Acoustical Society of America Fall Meeting will be held in Indianapolis, Indiana October 27-31, 2014 <http://www.acousticalsociety.org/content/fall-2014-meeting>



Inside ORE

2013-2014 Outstanding Graduate Student Award

This year's award was given to Betsy Seiffert. Congratulations!

Betsy grew up in Dubuque, IA, and graduated from the University of Iowa with a B.S. in Mathematics in 2002. She received her M.Oc.E. from Oregon State University in May 2010 under Professor Harry Yeh. Her master's thesis was titled "Flow visualization for wake formation under solitary wave flow." She used data extracted from particle image velocimetry (PIV) along with vector and tensor visualization techniques to study wake formation behind a vertical cylinder under solitary wave flow.

Betsy started at the University of Hawaii as a Ph.D. student in August 2010 under Professor Ertekin as a member of the

coastal bridge and port vulnerability to tsunami and storm surge project funded by the Hawaii Department of Transportation. Her dissertation is titled: "Tsunami and storm wave impacts on coastal bridges." Betsy has developed and executed an extensive set of laboratory experiments to investigate wave loading on coastal bridges, providing a valuable benchmark to validate numerical calculations and providing guidelines for full scale bridges. These experiments have included measuring horizontal and vertical forces due to solitary and cnoidal waves on a flat plate, a bridge model with girders, and a bridge model with different percentages of air relief openings between girders for both fully and partially inundated conditions. She has been published in the Coastal Engineering Journal, has presented results at MTS/IEEE OCEANS '12 in Yeosu, South Korea, and will be presenting results at OMAE 2014 in San Francisco, CA this June.

Before she got too busy, she paddled 6 man outrigger canoes with the Hui Lanakila canoe club. When she gets a chance, Betsy tries to make it to a yoga class, get out for a jog or read fiction.



Professor Nihous presenting Betsy with the 2013-2014 Outstanding Graduate Student Award on behalf of the selection committee

Inside ORE

For the Love of Waves

Andrew Schwartz



The reason I chose ORE for my avenue towards higher education, was the same as many aspiring engineers. We want to make the world a better place.

While adhering to this philosophy, I did not have a conventional path towards an advanced degree in an engineering field. I began my studies at the University of California, Santa Cruz when I read Dean and Dalrymple's text, "Water Wave Mechanics for Engineers and Scientists." I dedicated my academic career to gain the tools necessary to understand the book's concepts because of my personal connection to the ocean and desire to comprehend waves analytically. UC Santa Cruz does not offer a coastal engineering or physical oceanography degree, so I majored in physics to gain the mathematical skills necessary to understand sediment transport principals and wave theory. I supplemented courses in physics with classes in oceanography and two internships for more applied knowledge of waves and their interaction with beaches.

During my first internship, I studied swash zone dynamics at the University of Queensland in Australia. This was my introduction to coastal fieldwork and data analysis as well as computer programming. After completing courses in scientific computing and computational physics my senior year, I developed a

three dimensional model of swash zone dynamics based on a two dimensional ballistic approximation to swash propagation and was able to write my senior thesis on coding the numerical model and resulting data. My experience in Australia solidified my interest in coastal processes and helped me obtain my second internship at the U. S. Geological Survey (USGS) in Santa Cruz. With the USGS I applied the concepts I learned at the University of Queensland to sediment dynamics at Ocean Beach in San Francisco, California.



Andrew, Professor Ertekin and Betsy at graduation this spring

Continued page 6...

Inside ORE

"For the Love of Waves" continued from page 5

I studied sediment transport using high resolution mapping of the beach and nearshore system. Through the studies in San Francisco, I was able to gain employment with the Washington State Department of Ecology. There I was the field operations manager and primary data processing analyst of the Southwest Washington Coastal Erosion Study, which was in its 15th year of operation. The group created seamless maps of the coastal system by combining data from aerial photography, LiDAR, GPS, and sonar. This provided valuable experience in real world technical operations and in managing teams of interns, graduate students, and researchers on large scale projects. Planning, technical knowledge, troubleshooting, flexibility, and dedication were all essential components to ensure data was collected within time frames limited by study parameters, weather conditions, and tidal windows.

My goal for the ORE graduate program was to prepare for a career in renewable ocean energy. Implementing a variety of clean and renewable energy sources is one of the most critical research and development issues of our time. One of the reasons I chose ORE was for its flexibility in the core courses that allowed for adaptable and flexible choices of industry after graduation.

The education I received in the ORE program helped to expand my coastal processes knowledge and develop new skills for preparation in a career of renewable energy. For those preparing for a career in ocean renewable energy, the ORE program could be one of the best available to prepare engineers for a future of exciting horizons. The core courses of the master's degree program are intellectually exciting and directly applicable to available career paths.

My current career vision involves furthering the use of renewable energy to power local and national grids. I am particularly interested in reducing diesel-fueled power generation in Hawaii. I envision researching ideal combinations of available technology to minimize diesel fuel consumption, participating in project mobilization, and preparing environmental impact statements. This is a particularly exciting time in the evolution of how Hawaii will maintain its power needs, and I could not be happier to contribute to such an benevolent endeavor.

By the end of this month, my fiancé and our loving dog Lilly, will be permanent residents of Kauai. Advancements in power technology (i.e. the study of waves) is crucial in reducing costs for consumers on a per kilowatt hour basis and for reliability in the system. I am excited to be a part of island sustainability by applying what I have learned on my journey to understand waves in a way that can benefit all those that call our planet home. I truly appreciate that the ORE department has been more than capable of accommodating the needs of a diverse group of students and their individual interests. To my professors and mentors, I thank you very much for providing an environment where I had access to the tools necessary to accomplish the goals I set for myself in continuing my education. I have made life long friends and could not have expected such a great journey on the road to making the world a better place. To all those that I have had the pleasure of meeting along the way, thank you for being kind and supportive, and I can't wait to see how your knowledge of waves helps us down the road too!

New in ORE

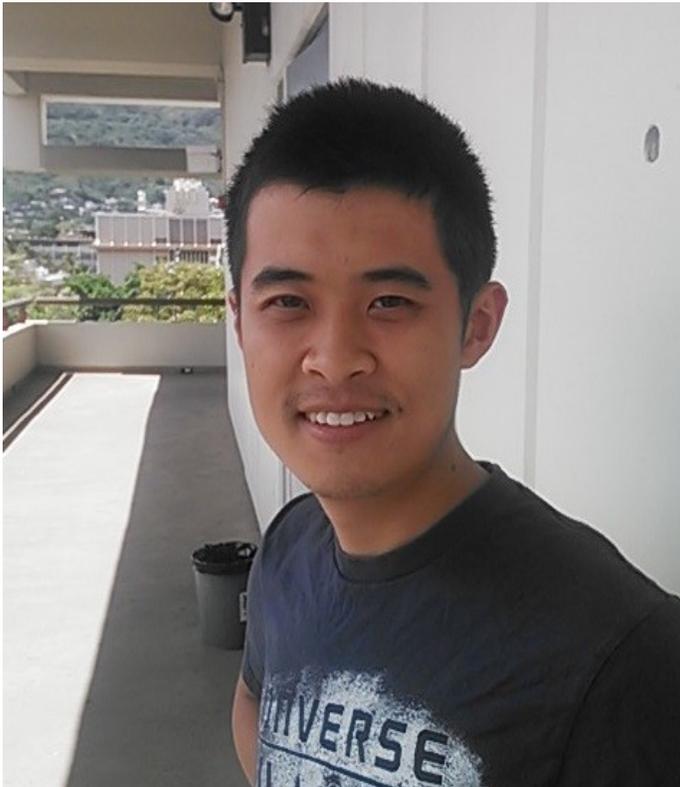
Florian Hillenhagen

Aloha,

My name is Florian Hillenhagen and I started as a Ph.D. student at ORE in the Spring of 2014. I work with Prof. Nihous on the 3d-modeling of multi-fluid flows (oil-water) for various applications. Prior to moving to Hawaii I did CFD simulations for BMW to answer questions concerning the underhood thermal management of their cars. In my free time I enjoy surfing and hiking and love Hawaii for its waves and warm waters all year round.



Conghao Xu



Aloha,

I am Conghao Xu, greetings to everyone. I have been a Ph.D student at ORE since the Spring semester of 2014. My research interests mainly focus on the numerical and experimental modeling of OWC type wave energy converters under the supervision of Prof. Huang, whom I have had the privilege of working with the prior two years. In my free time I enjoy listening to music, cooking, hiking, movies and hanging out with friends.

Inside ORE– First Annual Random Question Game Show

Eight contestants answered the following questions. The scoring was arbitrary and biased.
 Green = 3 points Blue = 2 points White = 1 point Yellow = negative 1 point
 The winner received their answer to question number 2.

1. What is your least favorite Greek symbol to write?
2. If you are hungry and only have \$5, where are you going to eat on campus?
3. If you invented a device to measure velocity potential, what would you name it?
4. What is your favorite computer software program that you use in your classes or research?
5. Do you take the stairs or the elevator when going up to the fourth floor in Holmes Hall?
6. What's the longest period of time you've gone without checking your cell phone in 2014?
7. If you could bring back any extinct animal, what would it be?
8. The longest amount of consecutive hours you've spent on campus this year?
9. You get to do one of the following: Go on a \$10,000 shopping spree or own a unicorn for a week. Which do you choose?
10. What is the closest distance that a bicyclist or skateboarder has come to hitting you on campus?

Question	Betsy	Linyan	Prof. H.	Matt	Yaprak	Derek	Anonymous #1	Andrew	Answer sought by judge
									
1	Σ	ξ	ζ	xi (ξ)	ζ	Tie ξ or ζ	ζ	λ	ξ or ζ
2	Govinda's	I'd go to 7-11 (off campus)	Campus Center	Poke Bowl at the Stir-Fry place in Campus Center	sorbet from Da Spot or tapioca pudding from Bale	Vending machine or ORE Seminar. That's all I need	Subway	Nowhere. Good nutrition is priceless	A side of meat at Laverne's
3	"Henry"	"VPM"	"Applemeter"	"My Ticket to \$1 Million"	"Wave Bender-Legend of the Ocean"	"I'm-still-not-entirely-sure-what-this-is-measuring-even-after-taking-609-ometer"	"Velopotentor"	"Velciraptor"	"φ Fi Fo Fum Model 7000"
4	OpenFOAM	Matlab	Matlab	Matlab but I like the retro feel of ACES	Hydran	AutoCAD 3D was fun. Kidding	Matlab	FORTRAN	good ole Excel
5	Elevator-science doesn't wait for stairs	Both	Yes	elevator up; stairs down	Busted! Elevators	Stairs are faster	Elevator	Stairs-I just sit at a desk otherwise	"Yes" or "No, I have a helicopter, jetpack, etc"
6	5 hrs?	5 days	3 days	when I sleep	16 hrs	1 hr	8 hours	2 hrs	> 1 day
7	Wooly Mammoth	None. I'm afraid of animals	dinosaur	Mousealope	Caribbean Monk Seal	Megladon	dinosaurs	Kaua'i Akialoa Hemignathus ellisianus stejneri	Megladon
8	16	21	12	10	12	24+	18	48	> 24
9	Unicorn	Of course a shopping spree	the former (- 1 for confusing the judge)	Shopping spree- what can a unicorn do for you? Unless it grants wishes	Unicorn-visit a children's hospital with it (Awww)	Unicom. Definetly a unicom	Unicorn	Unicorn-but not to own, just to know	Unicorn. If you had a unicorn you could easily make a lot more than 10k
10	not that close	0.5 m	1 m	close enough to curl my toes	A skateboarder hit me and crushed me into a column near POST	0 inches. Hurt him worse than it hurt me	5 cm	brushing, i.e. millimeters	so close that a bicyclist swerved to miss me and hit a skateboarder or vice versa
Total Points	16	13	15	19	19	24	16	20	

Congratulations Derek! You win \$5 towards future vending machine purchases

Inside ORE-In the Office

If you've walked into the ORE office within the last six or seven years, you've probably been greeted with a warm smile by Jazlyn Wandasaan. Jaz started working for ORE as a student in the Fall of 2007. In 2012, she started her graduate program at the Myron B. Thompson School of Social Work. Jaz was a member of the Phi Alpha Honor Society (Nu Sigma Chapter) and was the Secre-



tary of the School of Social Work Graduate Student Organization. She was also a part of a Hawaiian Learning Program (HLP). One of the projects she completed for the HLP was the development and implementation of a culturally-based curriculum that links sense of place with self-identity for people recovering from addictions. They just finished the curriculum and are collecting and analyzing the qualitative and quantitative data to validate their program so it can be implemented in the future. This spring, Jaz received her Master's in Social Work. We are proud of all that she's accomplished while working at ORE.

Final Page

Your Gift to the ORE Enrichment Fund

THE ORE ENRICHMENT FUND
(The University of Hawaii
Foundation
Account # 123-7310-4)

Yes, I'll support

My gift is:

- \$10,000 \$5,000 \$3,000
- \$1,000 \$500 \$300
- \$100 \$50 \$_____

My check is enclosed payable to:

The University of Hawaii Foundation

A matching gift program is offered through my (or my spouse's) employer,
 _____ (form enclosed)

The gift is in memory/honor of _____

Name(s): _____

Address: _____

E-mail: _____

Please do not include my name in the ORE Enrichment Fund Donor Report
 (I would like to be an anonymous donor).

Please mail your check and this form to: c/o ORE Enrichment Fund Administrator, Department of Ocean and Resources Engineering, University of Hawaii at Manoa, 2540 Dole Street, Holmes Hall 402, Honolulu, HI 96822, USA
Eml: adminore@hawaii.edu, **Tel:** +1 (808) 956-7572, **Fax:** +1 (808) 956-3498



Giulio, Conghao, Matt, Jonathan and Linyan catching a sunset over the Pacific



Hana O Ke Kai

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**ENGINEERING THE
 OCEANS SINCE 1966!**