

Volume 4, Issue 1

Fall 2002



DEPT. OF OCEAN AND RESOURCES ENGINEERING

HANA O KE KAI "Work of the Ocean"

## Chairman's Message



**I**t has been one year since I became Chair of Ocean and Resources

Engineering. One of my utmost duties is to maintain the continuing accreditation of the program by the Accreditation Board for Engineering and Technology (ABET). The current accreditation will expire in 2004. Meanwhile, ABET adopted a new set of

accreditation criteria known as Engineering Criteria 2000, which emphasizes the program outcomes as opposed to the academic program itself and requires the involvement of the program constituencies in the assessment process. Our students represent the most important constituency and the success of our alumni reflects positively on the program. Some of you might have already completed and returned the alumni survey. The results of the survey are encourag-

ing and prompt the need of a continuing dialogue with our graduates. I would like to use this newsletter as a forum to report the latest developments in the department and to exchange ideas with our alumni. Now that you have garnered real-world experience, your opinions on our program in retrospect are most valuable to us. Your participation in this process will ensure the continuing success of our program.

**Kwok Fai Cheung**  
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## Editor's Corner



**I**f you are wondering why this is Vol. 4, Issue 1 of Hana O

Ke Kai when you do not remember receiving past issues, do not be upset; you were probably not a student at the time past issues were published. The Ocean Engineering Newsletter Hana O Ke Kai's (which means "Work of the Ocean" in Hawaiian) inaugural issue was published in 01/83. This was followed by the

2nd issue in 08/83, the 3rd issue, Vol. 2, in 01/84, and the 1st issue, Vol. 3, in 08/84. That was the last issue until this one. This newsletter is for all that is touched by the ORE department since 1966. Without your contributions, we cannot continue telling about the department, and what our graduates are doing, or what the status of ocean technology in Hawaii is. So, please drop us a line or two, tell

us what you are doing, introduce your project or company. Our students are eager to hear about them. Contact an ORE faculty member to learn about projects or ask for a reprint. The possibilities are endless. Send feedback; tell us how we can improve our educational mission through your industrial experience. Mahalo!

**R. Cengiz Ertekin**  
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*This newsletter is for the alumni, friends, colleagues in industry, government and academia, students, faculty and staff of the Ocean and Resources Engineering Department*

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- Reporters—Carmela Chandrasekera, Kwok Fai Cheung, Yann Douyere, Edith Katada, Hal Loomis, Bala Padmanabhan, Geno Pawlak, David Rezachek, Hari Sundararaghavan, Yingfan Xu, John Wiltshire

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or mail them to the  
ORE Department  
c/o Editor, Hana O Ke Kai.

## Currents

### News from the Department...

- ◆ Prof. Hans Jurgen Krock is on sabbatical leave for the Fall semester. He will be back in the spring semester to teach ORE 202 and a new course, ORE 642 (Marine Environmental Remediation).
- ◆ A new research project “Environment for Design of Advanced Marine Vehicles and Operations Research (ENDEAVOR)” has been granted by ONR. The project is headed by Prof. Kwok Fai Cheung who is the PI. The other investigators are: Profs. Ertekin, Pawlak, and Yu. The project will be a team work between the University of Hawaii, Pacific Marine & Supply, Co., Sci-

ence Applications International Corporation, and Maui High Performance Computing Center.

- ◆ In conjunction with the preparation for the upcoming ABET review, two advisory panels were formed in the department: a) International Professional Advisory Panel, chaired by Dr. Thomas Mathai, and b) Local Professional Advisory Panel, chaired by Captain Karin Lynn, USN. These panels are made up of professional engineers

who work in industry, government and academia. They have recently completed their reports, advising the department in improving its educational and professional missions.

- ◆ Todd Gregory and Raymond Rojas won the 2000-2001 Best Graduate Student paper Award in

MS Category from the OOA Division of ASME. Their paper is entitled “Feasibility of a Cold Seawater Facility”. Congratulations to Todd and Ray!

*Did you know that you can receive ORE newsletters electronically?*

Visit <http://oe.soest.hawaii.edu/>

## Students' Voice

Since its establishment in 1966, the Department of Ocean and Resources Engineering has graduated a total of 172 MS and 47 PhD students. Many students come from different backgrounds and ethnicity. This diversity allows a good cultural interaction and exchange of ideas in the department.

Currently, student chapters of two professional societies are active. These are the [Marine Technology Society](#) (MTS) and the [Society of Naval Architects and Marine Engineers](#) (SNAME). Several service projects such as beach clean-ups have

been organized in the past semesters by the MTS and SNAME student bodies to contribute to the environment and to provide interaction between the groups. Besides the community service projects, many tours have been organized to different professional organizations, such as the Honolulu Ship Yard and Navatek Marine, and the Hawai'i Undersea Research Laboratory's facilities at the Makai Research Pier.

There are presently 25 students enrolled in the department as MS and PhD candidates. Seven of which are new in the department. They are:

- ◆ Mr. Ji CAO (China)
- ◆ Mr. Richard W. CARTER (USA)
- ◆ Mr. Eric W. HAHN (USA)
- ◆ Mr. Demont D. HANSEN (USA)
- ◆ Mr. Vasco NUNES (Portugal)
- ◆ Mr. Krishnakumar RAJAGOPALAN (India), and
- ◆ Mr. Hongqiang ZHOU (China).

On behalf of the students, staff and faculty, we would like to welcome the new students and wish them the best.

*Yann Douyere, Student Representative*  
[douyere@oe.soest.hawaii.edu](mailto:douyere@oe.soest.hawaii.edu)

## Faculty Profile



We welcome Dr. Geno Pawlak who joined the ORE department in March of 2001 as Assistant Professor. He received his BS in Aerospace Engineering and Mechanics from the

University of Minnesota in 1991 and his MS and PhD in Mechanical Engineering from UC San Diego in 1994 and 1997,

respectively. He conducted post-doctoral research in coastal hydrodynamics and taught at the University of Washington's School of Oceanography from 1998 to 2001.

Prof. Pawlak teaches Oceanography for Ocean Engineers, Nearshore Processes, and Environmental Fluid Dynamics. His teaching approach aims to incorporate laboratory experimentation and demonstrations into lectures as well as by use of field observation to augment the class-

room experience. His research interests address coastal hydrodynamics problems. Current research topics include wave and tidal flow over rough boundaries, sediment transport in reef systems, nearshore water quality, turbulence, stratified flow and internal waves. See [Project News](#) column for more information on his projects. You can reach him at (808) 956-8100 or e-mail him at [gpawlak@oe.soest.hawaii.edu](mailto:gpawlak@oe.soest.hawaii.edu). URL: <http://oe.soest.hawaii.edu/~gpawlak/>

## Looking Back

The Ocean Engineering Graduate Program was first proposed in 1965 to offer Master of Science Degree in the College of Engineering (COE) of the University of Hawaii. The objective of the interdisciplinary program was "...first, to educate graduate engineers in the application of engineering principles and techniques to problems unique to marine environments..." The proposal was developed by four faculty members of COE<sup>1</sup>, and it was approved in 1966.

In September of 1966, the Ocean Engineering Graduate program was inaugurated with the enrollment of two graduate students. The first student who entered the OE program was Fred Casciano who graduated in 1968 with an MS degree. In November of 1966, Prof. Charles L. Bretschneider assumed the chairmanship of the OE program. By September of 1967, the enrollment increased to 12 graduate students.

In July 1968, the OE program became a Department in COE and was granted administrative responsibility for the J.K.K. Look Laboratory at Kewalo Basin. There was only one faculty member in the depart-

ment at the time, Prof. Bretschneider, but a number of OE researchers worked at the Look Laboratory. Ms. Edith Katada has been with the OE program as the Secretary since the beginning.

When the first proposal<sup>2</sup> was made in July 1969 to establish a PhD program in Ocean Engineering, the number of OE faculty had increased significantly; they were C.L. Bretschneider, F. Gerritsen, A. Parvulescu, M. St. Denis and G. Venezian. And J.T. O'Brien, T. Lee, R.Q. Palmer, L.H. Seidl, and F. Casciano were the researchers at the J.K.K. Look Laboratory. The PhD Program in Ocean Engineering was approved in 1970. At the time, three categories of ocean engineering were in place:

- Port and Coastal Engineering
- Offshore and Continental Shelf Engineering, and
- Deep Ocean Engineering.

These three categories (which we currently call "option areas") were envisioned as dealing with problems from the coastline to the surf zone, from the surf zone to the continental shelf, and from the continental shelf to the deepest parts of the oceans.

Since 1966, the OE program has expanded in numbers and in scope. In 1989, with the establishment of SOEST at the University of Hawaii, the Ocean Engineering Department moved to this new School to form the technology component of the School, along with HNEI. More information can be obtained on the history of the department from a review article<sup>3</sup> that presents an overview of some of the developments in the department until 1992.

**R. Cengiz Ertekin**  
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1. Williams, J.A. and Venezian, G. (1969), "Ocean Engineering at the University of Hawaii," *Engineering Education*, ASEE, November, pp. 242-244.
2. Bretschneider, C.L. (1969), "Graduate Program for the Doctor of Philosophy in Ocean Engineering," A proposal submitted to the Graduate Division, University of Hawaii, July.
3. Krock, H.-J. and Ertekin, R.C. (1992), "Ocean Engineering at the University of Hawaii," *Marine Technology Society Journal*, Vol. 26, No. 1, pp. 28-35.

## Alumni News

◆ Carmela Chandrasekera (MS '93, PhD '00) is working as a Coastal and Estuarine Analyst at Philip Williams & Assoc. Ltd, San Francisco, CA. She mainly works on projects related to Coastal Flood Analysis (Flood Insurance Studies) and wetland restoration. Chandrasekeras have two children in 5th and 8th grades. Eml: [c.chandrasekera@pwa-ltd.com](mailto:c.chandrasekera@pwa-ltd.com)

◆ Balakrishna Padmanabhan (MS '91, PhD '99) is working as a Naval Architect at J. Ray McDermott, S.A., Houston, TX. He mainly works on projects related to SPAR platforms. He is the father of a two year old. Eml: [bala\\_pad@yahoo.com](mailto:bala_pad@yahoo.com)

◆ Hari Sundararaghavan (MS '92, PhD '00) is working as a Water Resources Engineer at WEST Consultants Inc., Tempe, AZ. He is presently involved on projects related to hydraulics and sediment transport of rivers and streams investigating problems involving channel design, stream habitat restoration, bank protections, watershed hydrology, floodplain delineations, free-way/highway drainage and bridge scour analysis. Eml: [webhari@icqmail.com](mailto:webhari@icqmail.com)

◆ Yingfan Xu, PE (MS '91, PhD '97) is working at Public Works Division of DAGS, State of Hawaii. Eml: [xuy001@hawaii.rr.com](mailto:xuy001@hawaii.rr.com)

*Ed.—Please send Alumni News to*  
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## Conference Calendar

### 2002

- ◆ **October 29-31, Oceans 2002**, MTS/IEEE, Biloxi, Mississippi. [www.oceans2002.com](http://www.oceans2002.com)
- **November 13-18, Underwater Mining Institute, New Perspectives on Seabed Mineral Deposits**. Te Papa, New Zealand. [www.soest.hawaii.edu/HURL/UMI2002](http://www.soest.hawaii.edu/HURL/UMI2002)
- **December 6-10, AGU Fall 2002 Meeting**, San Francisco, CA. [agu.org/meetings/fm02top.html](http://agu.org/meetings/fm02top.html)

### 2003

- **May 5-8, OTC**, Houston, TX. [www.otcnet.org](http://www.otcnet.org)
- **May 26-30, ISOPE 2003**, Honolulu, Hawaii. [www.isopec.org](http://www.isopec.org)
- **June 8-13, OMAE 2003, ASME**, Cancun, Mexico. [www.omaec.org](http://www.omaec.org)
- **June 30-July 4, Waves 2003**, Jyväskylä, Finland. [www.mit.jyu.fi/waves2003](http://www.mit.jyu.fi/waves2003)
- **August 25-27, Long Wave Symposium**, COPRI, Thessaloniki, Greece. [Michael.j.briggs@erdc.usace.army.mil](mailto:Michael.j.briggs@erdc.usace.army.mil)



# Hawaii's Ocean Technology

The following is a summary of a series of three projects related to the feasibility of finding alternatives to the Natural Energy Laboratory of Hawaii Authority (NELHA) facility at Keahole Point, Hawaii. NELHA uses deep, cold nutrient-rich seawater and warm surface seawater for: (1) aquaculture; (2) air conditioning; (3) industrial cooling; (4) manufacture of marine products, and (5) other innovative applications.

The first project involved Edward K. Noda and Associates, Inc., and the final two projects involved students in two different ORE 783 Ocean Engineering Design courses (Fall 2000 and Spring 2002).

## Feasibility Analysis for Establishment of NELHA-Type Facilities at Other Locations in Hawaii.

Further expansion at NELHA is currently limited by: (1) the difficulty and cost of preparing land at the site for use by tenants; (2) current effluent seawater disposal methods; and (3) the effects of topography and distance on seawater pumping energy requirements and costs.

The objective of this study was to identify areas in Hawaii that may have suitable conditions for establishment of shore-based facilities similar to NELHA. Three potential sites were selected for a preliminary economic analysis and comparison to the existing NELHA site. A comparative analysis of the proposed expansion of NELHA was also consid-

ered. The three sites analyzed included: (1) Kekaha, Kauai; (2) Port Allen, Kauai; and (3) Waionihu, Hawaii. The Kekaha site was selected for further evaluation and for a preliminary facility design.

## Preliminary Design of an NELHA-Type Facility at Kekaha, Kauai, Hawaii.

This study involved a detailed preliminary facility design for a possible NELHA-type facility at Kekaha, Kauai. The objective was to provide a facility layout that used the coldest water near the pumping facility and, whenever possible, provided for multiple uses of the cold seawater. Two different facility designs were developed.

## Preliminary Design of a Kalina-Cycle OTEC Power Plant at the Proposed NELHA-Type Facility at Kekaha, Kauai, Hawaii.

A proposed Kalina-Cycle OTEC power plant was designed to provide as much as possible of the electrical power requirements of the proposed Kekaha NELHA-Type facility. The OTEC power plant was designed to use warm and cold water delivered by the seawater delivery system designed for the proposed facility.

The objectives of this project were to

design a Kalina-Cycle Ocean Thermal Energy Conversion (OTEC) Power Plant at the proposed NELHA-type facility at Kekaha, Kauai, Hawaii and to provide electrical power in the most cost-effective manner.

Since the water supply was inadequate to provide all electrical and water supply requirements, some modification of the design of the proposed seawater supply

system was required. Owing to the long cold water pipe required at this site and the reduced flow available, only enough cold seawater was available to provide pump-

ing power for the facility.

*....a series of three projects related to the feasibility of finding alternatives to the Natural Energy Laboratory of Hawaii Authority (NELHA) facility at Keahole Point, Hawaii.*

**David Rezachek, PE (PhD '91)**  
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Ed.— This is the first of a series of articles by Dr. Rezachek, condensed from DAR Transition Plan Input Report prepared for the new Governor of Hawaii.

Please e-mail all contributions on Hawaii's Ocean Technology to:

[HanaOKai@oe.soest.hawaii.edu](mailto:HanaOKai@oe.soest.hawaii.edu)

# Hawaii Undersea Research Laboratory (HURL)

The Hawaii Undersea Research Laboratory (HURL) is one of six National Undersea Research Laboratories funded under NOAA's National Undersea Research Program. Each of the laboratories has a geographic and technical focus. In Hawaii, our technical focus is on manned submersibles and undersea robotics (ROVs) and our geographic focus is Hawaii, the northwest Hawaiian Islands and the Central and Western Pacific.

Academically, HURL is housed in the School of Ocean and Earth Science and Technology and is closely affiliated with the Department of Ocean and Resources Engineering, where myself, as the Acting Director of HURL, and HURL Chief Engineer, Dr. Dan Greeson are faculty members.

HURL operates a 225 ft research vessel, the Kaimikai-O-Kanaloa, two 3 person deep diving submersibles capable of going to 2000m depth, and a fiber optically

controlled ROV. This equipment is used in a wide range of engineering and scientific research projects. Ongoing projects include instrumenting and monitoring the underwater volcano at Loihi which has a major submarine landslide and tsunami threat; acoustically measuring deepwater fisheries habitats; monitoring cable laying surveys; environmental and structural surveys for OTEC pipes, sewer outfalls and other seabed ...

(Continued on page 5)

# Project News

**Field Observations of Wave Flow Over a Rough Boundary** is funded by the University of Hawaii Research Council. PI: Prof. Geno Pawlak. This project aims to characterize the effects of bound-



The Wave Boundary Layer Profiler (WBLP) instrument platform prior to lab testing at J.K.K Look Laboratory.

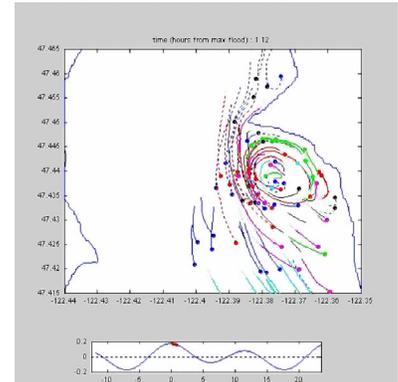


ORE student Marion Bandet adjusts instruments on the WBLP platform during field observations.

ity field in a wave boundary layer over a coral reef.

**Observations of Tidal Headland Eddies in Deep Water** is funded by the National Science Foundation. PI: Prof. Geno Pawlak is presently directing the NSF funded study, in collaboration with the University of Washington, which examines tidal flow around a headland in Puget Sound, Washington. This work has implications on estuarine and coastal circulation, pollutant transport and

coastal erosion. Three sets of field observations using ship-based acoustic profilers and satellite tracked drifters have taken place in 2001 and 2002. For further info, see [http://oe.soest.hawaii.edu/~gpawlak/three\\_tree\\_point.htm](http://oe.soest.hawaii.edu/~gpawlak/three_tree_point.htm)



Cumulative drifter tracks around Three Tree Point, Washington, for 10 days in June, 2002. The lower panel shows the tidal phase. Tracks identify the headland eddy and illustrate the flow coherence on distinct tidal cycles. See website for full animation.

## Where am I?



After living on Bainbridge Island (near Seattle) for four years, I moved back to Hawaii. I liked the weather in Seattle better but chose instead to be with Robin (wife) and Kaiser (medical plan). Before travel got to be such a hassle we managed a month in England and three weeks in Vietnam and Laos.

Finally I wrote up and published a paper, "The Momentum of Tsunami Waves" in Science of Tsunami Hazards: The International Journal of the Tsunami Society, Vol. 20, No. 1 (2002), which can be found at [www.sthjournal.org](http://www.sthjournal.org). This presents an idea that had been in my mind for years that it should be worthwhile to look at the momentum delivered to tsunami waves by source mechanisms at the time of generation. Lately this is looking like an even better idea since adding undersea landslides to earthquake deformation seems to be necessary to get observed wave heights.

**Prof. Harold Loomis (Retired 1995)**  
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*Ed.—Please share with us where you are and what you do lately. Send e-mail to : [HanaOKai@oe.soest.hawaii.edu](mailto:HanaOKai@oe.soest.hawaii.edu)*

## HURL (Continues)

(Continued from page 4)

...structures; environmental monitoring of coral reefs and bottom communities including putting out experiments to assess benthic recoveries from storm or development activities, bait stations for fisheries assessment, and bacterial sample collection under high temperature and pressure for DNA evaluation and cloning for the biotech industry.

Naturally, this range of projects and equipment provides excellent opportunity for ORE graduate students to obtain unique thesis material. There have been a number of excellent recent theses on sampler construction, engineering analysis of the stress components on the submersible's modular frame, snap load analysis of the submersible lift system and others. A wealth of new projects are anticipated to fully train future ORE graduates in submersible engineering.

**John C. Wiltshire**  
Acting Director of HURL &  
ORE Faculty Member  
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To those of you who have not visited your home for a long time: do you remember what the picture on the left shows (aside from the easily recognizable undergrads)?

*Ans. Founders Gate at the corner of Dole St. and University Ave.*



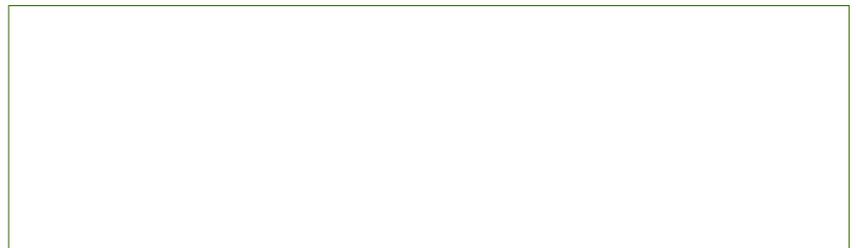
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**ADDRESS CORRECTION REQUESTED**



**Engineering the Oceans  
since 1966!**



## Some Recent Publications

- Chandrasekera, C.N. and Cheung, K.F. (2001). "Linear refraction-diffraction model for steep bathymetry," *Journal of Waterway, Port, Coastal, and Ocean Engineering*, ASCE, 127(3), 161-170.
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- Wiltshire J, Moore, K. and Lay, T. (2001), "Environmental Management of Tailings from Deepsea Mining through Soil Engineering," *Proc. Ocean Mining Symposium*, September, Szczecin, Poland. p.82-87.