



**IEEE**



# Oceanic Engineering Society

## Newsletter

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**Bridges Across the Oceans**  
OCEANS'04 with IEEE TECHNO-OCEAN'04

**OCEANS'04 MTS/IEEE TECHNO-OCEAN'04**

*November 9-12, 2004, Kobe, Japan*

see pages 14 & 15



## IEEE OCEANIC ENGINEERING SOCIETY

### President

THOMAS F. WIENER  
2403 Lisbon Lane  
Alexandria, VA 22306-2516  
+1 703 768 9522  
t.wiener@ieee.org

### Newsletter Editor

FREDERICK H. MALTZ  
821 Runningwood Circle  
Mountain View, CA 94040  
+1 650 967 5092  
+1 650 969 9390 (FAX)  
f.maltz@ieee.org

### Vice President

**Technical Activities**  
STANLEY G. CHAMBERLAIN  
Raytheon Electronic Systems  
MS T3TN46, 50 Apple Hill Dr.  
Tewksbury, MA 01876  
+1 508 858 5012  
+1 508 585 1955 (FAX)  
s.chamberlain@ieee.org

### IEEE Newsletters

PAUL DOTO  
445 Hoes Lane  
Piscataway, NJ 08855-1331  
+1 732 562 3945  
+1 732 981 1855 (FAX)  
p.doto@ieee.org

### Vice President

**International Activities**  
JOSEPH R. VADUS  
Global Ocean Inc.  
8500 Timber Hill  
Potomac, Maryland 20854  
+1 301 299 5477  
+1 301 983 4825 (FAX)  
jvadus@erols.com

### Journal of Oceanic Engineering Editor

JAMES F. LYNCH  
Oceans Physics and  
Engineering  
203 Bigelow Building  
Woods Hole Oceanographic  
Institution  
Woods Hole, MA 02543

+1 508 457 2000 x2230  
jlynch@whoi.edu

### Vice President, Professional Activities

JAMES S. COLLINS  
Dept. of Elec. and Comp.  
Engineering  
University of Victoria  
P.O. Box 3055  
Victoria, B.C., Canada V8W 3P6  
(250) 595-6928  
(250) 595-6908 (FAX)  
j.s.collins@ieee.org

### Secretary

STEPHEN M. HOLT  
11950 Grey Squirrel Lane  
Reston, VA 20194  
+1 703 610 2000

+1 703 610 1767 (FAX)  
sholt@mitretek.org

### Treasurer

JAMES T. BARBERA  
13513 Crispin Way  
Rockville, MD 20853  
+1 301 360-4347  
+1 301 871 3907 (FAX)  
j.barbera@ieee.org

### Web Coordinator & Publicity

Archie Todd Morrison III  
Nobska Development  
Corporation  
Falmouth, MA 02540 USA  
+1 508 360 2393  
+1 508 539 0808 (FAX)  
atmorrison@ieee.org

### Jr. Past President

GLEN N. WILLIAMS  
Engineering Program Office  
Texas A&M University  
College Station, TX 77843-3112  
979 845 5485  
g.williams@ieee.org

### Sr. Past President

CLAUDE P. BRANCART  
18 Juniper Road  
Brunswick, ME 04011-3414  
207 729 7873  
monkfish@blazenetme.net  
c.brancart@ieee.org

### Membership Development

KENNETH FERER

### Nominations

CLAUDE P. BRANCART

### Chapters

NORMAN MILLER

### Journal Editor

JAMES F. LYNCH

### Awards and Fellows

DAVID WEISSMAN  
Dept. of Engineering  
104 Weed Hall  
Hofstra University  
Hempstead, N.Y. 11549  
516 463 5546  
516 463 4939 (Fax)  
eggdew@hofstra.edu

### Publications Review Board

GLEN N. WILLIAMS

### Newsletter Editor

FREDERICK H. MALTZ

### Pace

NORMAN D. MILLER

### TAB Engineering Research and Development Policy Committee

JOSEPH R. VADUS

## EX-OFFICIO

## ELECTED ADMINISTRATIVE COMMITTEE

JAMES BARBERA  
(see Treasurer)

ROBERT T. BANNON, President  
Bannon International Consulting  
301 Willow Run  
East Stroudsburg, PA 18301-8591  
rtbannon@ieee.org  
570 619 5430  
570 619 5107 (Fax)

CLAUDE P. BRANCART  
(see Ex-Officio)

JERRY C. CARROL  
411 Country Club Drive

Picayune, Ms. 39466  
email: jerryc@datasync.com

STANLEY G. CHAMBERLAIN  
(see Vice President, Technical Activities)

JOSEPH CZIKA, JR.  
T.A.S.C., Inc.  
13605 Dulles Technology Drive  
Herndon, VA 20171-4603  
j.czika@ieee.org  
703 793 3708  
703 561 0800 (Fax)

RENE GARELLO  
(see Chapter Chairman, France)

STEPHEN M. HOLT  
(see Secretary)

PAMELA J. HURST  
Lockheed Martin Maritime Systems  
& Sensors  
17 Danielle Avenue  
Westerly, RI 02891  
Cell 401-481-3828  
pamela.hurst@lmco.com

WILLIAM M. CAREY  
(see Journal Associate Editor)

CHRISTIAN DE MOUSTIER  
(see Journal Associate Editor)

PROF. DIANE E. DIMASSA  
Massachusetts Maritime Academy  
Engineering Dept. Harrington 215A  
101 Academy Drive  
Buzzards Bay, MA, 02532  
508-830-5000 x1212  
ddimassa@maritime.edu

FERIAL EL-HAWARY  
(see Chapter Chairmen)

## IEEE OCEANIC ENGINEERING SOCIETY TECHNOLOGY COMMITTEE CHAIRS

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## President's Message

### What are we doing?

#### Rewriting our Constitution and By-Laws

As promised, the major portion of the May Administrative Committee meeting was devoted to the proposed revision to our Constitution and Bylaws. When the dust had settled, we decided not to change our Presidential and Vice Presidential Structures. We generally accepted moving some items from the Constitution to the Bylaws, and moving some items from the Bylaws to a newly-created Policies and Procedures document. We also agreed to clean up some infelicities of language.

After the discussion, we turned the proposal over to a Committee of Ten. They will do the final wordsmithing, and then the Administrative Committee will vote on it. If they approve it, the Constitution will be referred to the Membership who will vote on final approval.

### Changing our Field of Interest Statement.

Article II, Section 1, of our Constitution contains the Field of Interest Statement for the IEEE Oceanic Engineering Society. Even though it is part of the Constitution, changes to it involve a different process. The Administrative Committee approved the change. It must then be referred to the Presidents of the IEEE Societies and Councils, so that they can be sure that the proposed change does not inappropriately overlap their Fields of Interest.

At the meeting in Houston, the Administrative Committee did review our Field of Interest Statement and approved a change. Below is the letter I sent to the Technical Activities Board requesting their approval.

Our current Field of Interest Statement, last revised in 1982, is:

- The field of interest of the Society shall include all applications of electrical and electronic engineering pertaining to all bodies of water. Included are design, testing and application of water-oriented systems, subsystems, and components. This shall include scientific, technical and industrial applications, or other activities that contribute to the field, or utilize the techniques or



Thomas F. Wiener

products of the field, subject to modifications directed or approved by the IEEE Technical Activities Board as the art develops.

The proposed Field of Interest Statement is:

- The field of interest of the Society includes all aspects of science, engineering, and technology that address research, development, and operations pertaining to all bodies of water. This includes the creation of new capabilities and technologies from concept design through prototypes, testing, and operational systems to sense, explore, understand, develop, use, and responsibly manage natural resources.

We propose this change for three reasons:

- First, in consonance with the recent broadening of qualifications for IEEE membership, we propose to remove the explicit reference to electrical and electronics engineering. We find, as do most Societies, that many of our members have degrees in other disciplines, including not only physics, but also chemistry and mechanical engineering. In fact, many universities' Ocean Engineering programs as conducted by the Mechanical Engineering Department.
- Second, and again in consonance with the complexity and multidisciplinary nature of Oceanic Engineering, we chose less limiting language to encourage all practitioners and researchers to understand the affinity they have for the activities and members of the Society.
- Finally, we acknowledge the ocean as a single natural resource supporting the well-being of the world and our responsibility for understanding and protecting that resource.

### IEEE/OES As The Primary Source Of Oceanographic Information

#### Let's Get Famous!

This is the heading I used in last winter's Newsletter. Since then, I have been working on IEEE issues for the Technical Activities Board. TAB is developing its own set of "issues". I put that in quotes because we have, in recent years, come to use that issue

instead of “problems”. Most of what we speak of as “issues” are really problems, but nice people don’t have problems. At any rate, as I went through the list of items, dealing with how to price and package publications, and how to increase membership, and how to improve governance, I came to the realization that the IEEE, and our Society as well, face two over-arching issues:

**How can IEEE become an essential part of the lives of researchers and practitioners in our field of interest?**

**How can IEEE maintain its preeminence as the source of technical information in our field of interest?**

These are, of course, interdependent and form a positive feedback loop.

Change IEEE to OES and you are faced with the problem we need to solve. How do we make our meetings the meeting of the year for members of the Oceanic Engineering Community? How do we make our Journal the one that, if you don’t publish there, it doesn’t really count? How do we foster, encourage, and support local groups of our community members (Chapters) that are vibrant and that, if you don’t participate in their activities, you aren’t really a member of our community? These questions are what your leadership will be working on for at least the next six months, and, I hope, for the coming years.

## 2004 Conferences

As I write this, our colleagues in the Baltic Countries are conducting the First U.S. Baltic International Symposium on “Advances in Marine Environmental Research, Monitoring and

Technologies” in Klaipeda, Lithuania. The symposium is sponsored by the IEEE Oceanic Engineering Society, IEEE Region 8 and the Center for Marine Research, Ministry of Environment, Lithuania. One hope is that this initiative will help IEEE members in Lithuania move forward in forming a new IEEE section and an OES Chapter in Lithuania. At present the only Chapter in Lithuania is a Microwave Theory and Technique Chapter which is administered by the Polish Section.

At the same time, AUV ’04, organized by Claude Brancart, is being held in the exotic Maine wilderness. This year’s topic is multiple AUV operations. There will be two sessions per day. The last session will attempt to look into the future and formulate benchmarks to challenge people and create a vision for future multiple AUV research.

We will finish the year with one major conference per month. In September, we are participating in the International Geoscience and Remote Sensing Symposium ’04 in Anchorage, Alaska. In October, IEEE SENSORS 2004 will be in Vienna, Austria. In November, OCEANS/Techno-Oceans ’04 MTS/IEEE will be held in Kobe, Japan with Tamaki Ura as General Chair. We are also in September. Finally, in December, we will present the Second Homeland Security Workshop at Valley Forge, Pennsylvania, U.S.A. Please join in, come to the meetings, and make them the sort of meeting that you cannot afford to miss.

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## From the Editor

### Spring 2004 POTE Meeting

This year’s IEEE Panel of Technical Editors Meeting was held April 23-24 in Boston, MA. It was a very productive meeting and here are some highlights that you might find interesting, plus a related item.

### IEEE Xplore Usage Statistics show a doubling year over year

In the session on how IEEE Gauges Content Quality, Barbara H. Lange, Director, Publications Product Line Management and Business Development described the various methods IEEE uses and how various societies compare. It is interesting to note that the Signal Processing Society Transactions on Acoustics, Speech and Signal Processing rates very highly among others in usage and patents. Two other societies that have similar interests as we, likewise are near the top, namely, CS and GRSS.

### IEEE Release 1.6 of December 28, 2003 has significant enhancements

In the session on Xplore Update, Gerry Grenier, Staff Director, Publishing Technologies described five significant enhancements, namely inclusion of subscription identifier, “cover to cover” material for publications, electronic re-use permissions, reference links for Magazines and a new search engine installed. The next release,



Fred Maltz

expected by the end of summer 2004, promises approximately 80% of the collection will be full-text text searchable.

### All Society Research Project had some interesting findings

Elena Gerstmann, Director, IEEE Research Corporate Strategy and Communications was the coordinator for the study. In February 2003 - Society Presidents endorsed a research project that would, for the first time, survey all IEEE Societies. Each Society appointed a representative to a project team consisting of 37 Society representatives. One of the overall findings was that mem-

bers of small Societies are more engaged in IEEE, emphasize networking more, attend more conferences, volunteer more, and are more satisfied with their volunteer activities than are members of larger Societies.

### An Item related to the All Society Research Project

James S. Collins, OES Vice President for Professional Activities represented our society for the project. In the last issue of the newsletter, I included a sampling of some of the results obtained, and which were specific to the OES.

*See page 8 for the additional item which is related to the All Society Research Project.*

# 2004 IEEE International Symposium on Underwater Technology

*The Howard International House  
Taipei, Taiwan, R.O.C.  
April 20-23, 2004*

The UT '04 consisted of three days of technical presentations with keynote speeches, talks, and a first-day technical/sight-seeing tour.

## Technology Tour

**Hsin Chu Science Park (HSP).** HSP has strived to develop a favorable environment for investment, to attract high-tech talent, to introduce advanced technologies, and thus to promote domestic industry. Over past 23 years, the government has invested approximately US\$1,006 million in the Park's infrastructure. Following decades of effort, HSP has become to be a paragon of success, not only attracting overseas guests and media, but also becoming a topic of discussion for scholars of economics and rural and urban development.

**Opto Tech.** This is the world's leading manufacture of LED components and an innovator of LED system product solutions for a daily basis purposes including outdoor/indoor LED screen, traffic signaling, intelligent signage, LED lighting. Opto Tech also provides products and custom designing services on silicon and sensor components.

## Keynote Speeches

**"A possible mechanism for acoustic triggering of decompression sickness symptoms in deep-diving marine mammals"**, John Potter, Professor, National University of Singapore, Singapore.

**"Innovation and Integration through Ocean Exploration"**, CAPT McLean Director, NOAA Office of Ocean Exploration, U.S.A.

**"Technical Advances in the Naval Oceanography and Meteorology Programs."**, Ed Gough, Technical Director, Naval Meteorology and Oceanographic Command, U.S.A.

**"Status of Underwater Technology in Taiwan"**, Yi-Nan Chen, President, United Ship Design and Development Center, Taiwan

The conference entertained the delegates by various social functions, including 1) reception, 2) banquet, and 3) last-day cultural tour. This was a remarkable environment to indulge all delegates in the frontier of underwater science and technology and a useful opportunity for the presentation of scientific work and experiences.







## Top High School Science Students Win Educational Trips and Other Prizes at National Ocean Sciences Bowl

*Teams from California, Washington,  
Colorado, Texas, Florida, Hawaii,  
Wisconsin and Mississippi Win Prizes*

FOR IMMEDIATE RELEASE

CONTACT:

Katherine Hutt 703-938-4540  
Amy Lorenzen 202-332-0063  
ext.1232

Charleston, SC (April 26, 2004) – The 7<sup>th</sup> Annual National Ocean Sciences Bowl was won by the team from Mission San Jose High School from Fremont, California. In all, more than 2,200 students from 400 high schools around the country competed in 24 regional competitions, and those were challenged at the national event in questions related to ocean biology, chemistry, geology, physics, navigation, geography and more.

“Fostering a stewardship ethic is one of the most important goals of the NOSB,” said Rear Admiral Richard West (USN, retired), President of the Consortium for Oceanographic Research and Education in Washington, D.C., which sponsors the annual competition. He discussed the report released last week by the U.S. Commission on Ocean Policy, saying, “The opportunities for young scientists in the future seem almost as boundless as the seas,” and he urged the students to consider ocean sciences for their college and career choices.

The Mission San Jose team (last year’s runner-up) won an educational field trip to Hawaii. The following teams also won awards at the NOSB:

Second place: Friday Harbor High School, Friday Harbor, Washington (trip to Bermuda)  
– first time at nationals and only their second year in the competition

Third place: Poudre High School, Ft. Collins, Colorado (trip to Catalina Island, California) – third time at nationals, first time in the final four, only land-locked state to place

Fourth place – Incarnate Word Academy, Corpus Christi, Texas (trip to the Great Lakes)  
– sixth time at nationals, first time in the final four

*(continued)*

## NATIONAL OCEAN SCIENCES BOWL – PAGE 2

The following teams placed in the finals: 5<sup>th</sup> – Santa Monica High School, California; 6<sup>th</sup> – Maritime and Science Technology High School, Miami; 7<sup>th</sup> – Maui High School, Hawaii; 8<sup>th</sup> – Marshfield High School, Wisconsin. The prestigious James D. Watkins Sportsmanship Award (named for the founder of the NOSB) went to the team from Poplarville High School in Poplarville, Mississippi.

In addition to the academic competition, the weekend included field trips to ocean-related locations around Charleston. All participants in the NOSB are eligible to apply for summer internships and college scholarships sponsored by the National Oceanic and Atmospheric Administration (NOAA), the largest supporter of the NOSB.

The NOSB® is sponsored by the Consortium for Oceanographic Research and Education in Washington, D.C., which seeks to expand students' interest in ocean sciences as a college and career possibility.

*The National Ocean Sciences Bowl receives financial support from nine federal agencies via the National Oceanographic Partnership Program. The agencies include: Department of Energy, Environmental Protection Agency, Minerals Management Service, National Aeronautics and Space Administration, National Oceanic and Atmospheric Administration, National Science Foundation, Office of Naval Research, Oceanographer of the Navy, and the U.S. Geological Survey, as well as numerous private businesses and foundations.*

*The NOSB® program is organized by the Consortium for Oceanographic Research and Education (CORE), the Washington, DC-based association of U.S. oceanographic research institutions, universities, laboratories and aquaria. Its mission is to promote, encourage, develop and support efforts to advance knowledge and learning in the science of oceanography and to disseminate such knowledge to the scientific community and to the public.*



# Stellar Technical Program Fuels OTC .04 Success

RICHARDSON, Texas, U.S.A. (6 May 2004) - Many of the 250-plus technical presentations had standing-room-only attendance during the four-day Offshore Technology Conference (OTC), 3-6 May 2004. A 19-year high of 50,921 attendees converged at Reliant Center at Reliant Park in Houston.

"A committee of more than 150 volunteers representing each of OTC's sponsoring organizations spent over a year creating the best technical program that I have seen since I became involved in OTC in 1979," said Rod Allan, OTC .04 Chairman. "The presentations delivered pertinent information on the latest trends and technologies in the offshore world.

There's no doubt in my mind that OTC is a leading technical conference in the oil and gas industry, not just the largest exhibition in the industry. Skipper Strong, the OTC .04 Program Committee Chair, and his talented assembly of volunteers have risen to the challenge."

The 50,921 participants in 2004 give OTC the highest attendance since 1985. Those attending OTC represent 110 nations from around the world.

The exhibition at OTC this year included more than 2,120 exhibiting companies, totaling 397,750 net square feet, filling all the available indoor and outdoor space.

OTC also celebrated the first Spotlight on New Technology winners. Fifteen companies were recognized by OTC for their innovative contributions to the offshore world.

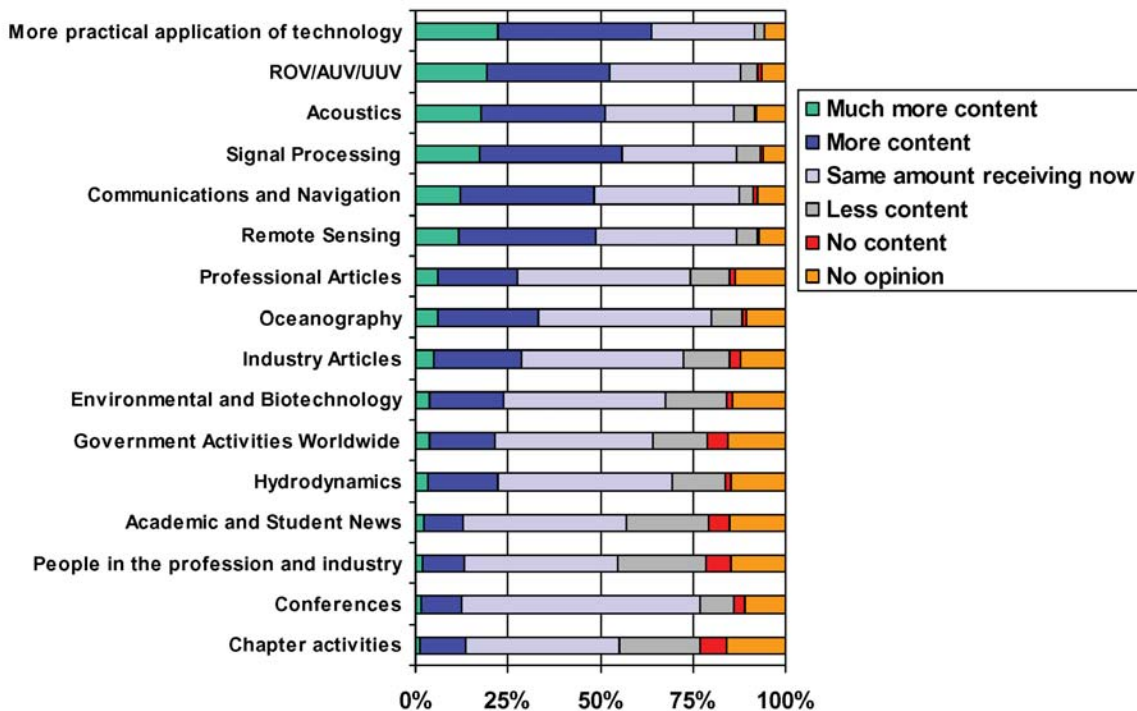
The 2005 OTC, "A Sea of Resources—An Ocean of Knowledge," takes place 2-5 May at Reliant Center at Reliant Park. For more information, visit [www.otcnet.org/2005](http://www.otcnet.org/2005).

*Founded in 1969, the Offshore Technology Conference is the world's foremost event for the development of offshore resources in the fields of drilling, exploration, production and environmental protection. OTC is held annually in May at the Reliant Center at Reliant Park in Houston. For more information, visit [www.otcnet.org](http://www.otcnet.org).*

(continued from page 4)

## EXCERPT FROM THE ALL SOCIETY RESEARCH PROJECT

Indicate the amount of content coverage in the following areas you would like to see in OES publications, conferences, products and services.  
(Choose one for each item.)





## Soundings by John Irza



Welcome to the latest installment of “*Soundings*”, a column that reports on a broad spectrum of news items from the mainstream media as they relate to Ocean Engineering technologies. The purpose of this column is to inform the ocean engineering community of our industry’s visibility in the media and how the general public perceives our efforts.

### Return to Titanic

Shipwrecks, tragic as they are, often serve to draw the general public’s attention to the ocean environment and the application of technology therein. The Titanic continues to generate news with Dr. Robert Ballard’s return to the wreck in June of 2004. In this latest expedition (a few days from beginning at the time of this writing), Ballard and other researchers hope to spend 2 weeks surveying the wreck site in the hopes of preserving the area from un-authorized removal of artifacts.

The expedition will feature live broadcasts from the National Oceanic and Atmospheric Administration research vessel Ronald H. Brown, transmitted to the Mystic Aquarium Institute for Exploration and to schools and research centers nationwide. For more information on the web, go to <http://www.mysticaquarium.org/immersion/>



### Third Seawolf-class Submarine Christened

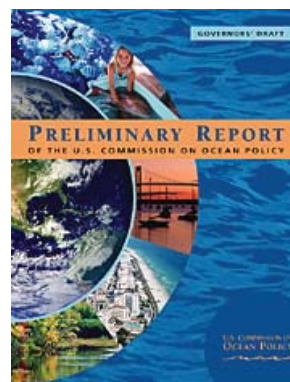
Another high profile event that often brings attention to our corner of the world is the christening of a submarine. On June 5, the US Navy’s newest Seawolf-class nuclear-powered submarine *Jimmy Carter* (SSN 23) was christened at a ceremony at General Dynamics Electric Boat in Groton, Conn. This is the third and final sub in the Seawolf-class, weighing in at 12,139 tons, sporting a beam of 40 feet, and covering a length of 453 feet. The new submarine honors the 39th president of the United States who is the

only submarine-qualified man who went on to become the nation’s chief executive. The *Jimmy Carter* is unique from all other undersea vessels in that it is a Multi-Mission Platform (MMP), which includes a 100-foot hull extension that enhances payload capability, enabling it to accommodate advanced technology required to develop and test an entirely new generation of weapons, sensors and undersea vehicles. Upon commissioning in 2005, *Jimmy Carter* will join the U.S. Pacific Fleet under the command of Cmdr. Robert D. Kelso.



### US Ocean Policy Commission Releases Preliminary Report

Amid a fair degree of mainstream media publicity, the U.S. Commission on Ocean Policy released its Preliminary Report with detailed findings and recommendations for a coordinated and comprehensive national ocean policy. The commission invited comments on the preliminary report until June 4. The goal of the report is to provide a guide to achieving a balanced approach to protecting the marine environment while sustaining the vital role oceans and coasts play in our lives and national economy. The 16-member Commission was mandated by the Oceans Act of 2000, authorized by Congress and appointed by the President.



While the reader is encouraged to review the entire report, two sections bear particular relevance to technologists:

**Part III:** Ocean Stewardship: The Importance of Education and Public Awareness

**Part VII:** Science-based Decisions: Advancing Our Understanding of the Oceans

The report can be found on the web at <http://www.oceancommission.gov/>

### Sponges Clean Up in Fiber Tech

In yet another example of nature’s talent for engineering, a recent *Nature* article described how scientists have discovered

a sponge existing in dark, cool waters that produces high quality optical fibers. The sponge, nicknamed the “Venus Flower Basket,” grows natural biological glass fibers up to 7 inches in length. The natural fibers are much more flexible than man-made fiber, which will break if bent too far. Scientists have tied natural fiber into tight knots and still have not broken the fiber.

The fibers exhibit optical transmission characteristics as well as man-made industrial optical fiber. More importantly, the sponge’s fiber is formed at cold temperatures and also has a level of sodium added to its material which gives the fiber improved transmissibility. Commercial manufacturing technology, which uses high temperatures to create a more brittle fiber, cannot add sodium because of the temperatures involved.

The discovery is yet another example of the growing field of Biomimetics: studying naturally engineered systems and applying the knowledge to technology.

## LASH-ing Out

*USA Today* recently ran an article describing the US Navy’s plans to test the Littoral Airborne Sensor *Hyperspectral*, or LASH surveillance system off the coast of Japan this Fall. An earlier version of LASH had been used to detect spotted whales and submarines below the surface of the ocean. The system detects submerged targets by analyzing underwater color patterns and detecting color gradations too faint for the human eye to notice.

Because North Korean and Chinese submarines frequent the area where the testing will be conducted, the potential exists for a heightened level of tension in the area.

The LASH system was developed by Hawaii-based Science & Technology International (STI). Because the system uses reflected sunlight to illuminate a target, it is useful only during daylight hours. More information can be found on the web at <http://www.sti-industries.com/index.html>



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## Ongoing Ocean Engineering Research at MIT

### Achieving a Fuller Understanding of the Ocean and the Systems that Effectively Utilize this Extensive Resource

**By Dr. David Burke**  
**Senior Lecturer**  
**Department of Ocean Engineering**  
**Massachusetts Institute of Technology**  
**Cambridge, Massachusetts**

Visitors to the Hart Nautical Museum in the Department of Ocean Engineering at the Massachusetts Institute of Technology (MIT) have the opportunity to interact with an educational version of "Finding Nemo." Undergraduate students Aaron Sokoloski (junior, mechanical engineering), Audrey Roy (junior, electrical engineering) and Katie Wasserman (senior, ocean engineering) have developed an interactive virtual aquarium that uses actual flow field data to display the vortices behind swimming fish.

iQuarium is a colorful, interactive aquarium display screen that features swimming fish and a visible flow field in their wake. The student team has created an animated fish screensaver with 3D modeling and rendering software, based on libraries of empirical data that exist on fluid flow phenomena such as the complex vortices that form around live swimming fish. Vortical flow field visualizations have been broken down into a library and brought together into a pseudo-realtime sequence that a user can control. Anyone who passes by the display will be able to see the vortices shed almost instantly as the fish swim.

The project is one of a number of iCampus projects sponsored by MIT and Microsoft Research that seek to revolutionize the practice of higher education with the tools of information technology. Many other research projects in the department provide the fundamental technology to support government and industrial sponsors.

#### Hydrodynamics of Swimming Fish

Aquatic creatures such as fish have had the luxury of optimizing their design through evolution to achieve remarkable locomotive skills. Some of the larger swimmers that are optimized realize high swimming speeds, long ranges and excellent propulsive efficiencies. Many fish over a broad scale of sizes have, likewise, developed maneuvering techniques that allow them to complete a 180° turn in less than half of their body length.

Professors Michael S. Triantafyllou, Dick K.P. Yue and Alex Tchet have developed a suite of tools to analyze fish straight-line swimming and maneuvering, both through experimental observations and measurements, as well as detailed approximate analytic and numerical methods. Sponsored by the Office of Naval Research (ONR), these efforts have addressed theoretical and experimental basic research issues involved in the fluid mechanics, sensing and



Graduate students visualizing fish motion at iQuarium.

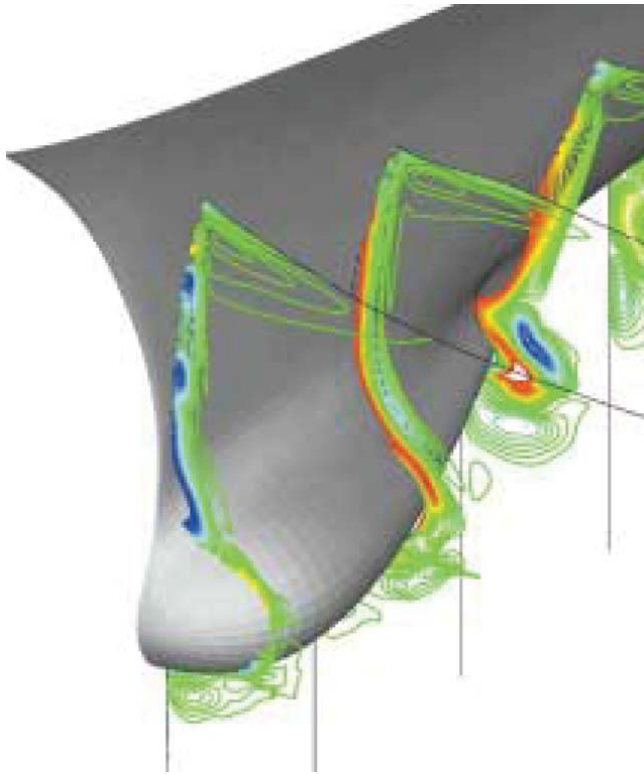
control, and actuation of a 3D unsteadily flapping foil employing vorticity control to enhance the underwater agility of rigid-hull marine vehicles. The results of the study will form a basis for the near-term development of technology to augment and enhance the capability of existing vehicles.

The flapping foil is a self-contained thruster device that can be used to provide the necessary control forces to submersibles and surface ships in rapid maneuvering. Ongoing projects focus on developing novel underwater vehicles capable of enhanced agility in the surf zone and cluttered environments. The vehicles have a rigid hull, but will be equipped with biomimetically designed flapping foils and undulating fins for propulsion and promaneuvering. The shape of the hull and the actuation and control of the foils will be based biomimetically on the structure and function of fish and mammals that have adapted to similar environments. This will generate a near-term enhanced capability for ocean observation in shallow water and cluttered reef areas.

#### Underwater Acoustics

In the area of ocean acoustics, Professors Henrik Schmidt, John Leonard and other MIT faculty have developed a multi-disciplinary, systems-oriented approach to the solution of ocean-related problems. Among these efforts is a major program with strong ONR and international support from the North Atlantic Treaty Organization SACLANT Undersea Research Centre involving the integration of new autonomous ocean observation and environmental modeling capabilities with acoustic sensing techniques to provide the next genera-





Distributed vortices along a ship hull.

tion of sonar systems and robust and reliable forecasting capabilities for ocean environmental management and technical naval operations.

A very successful generic ocean array technology sonars (GOATS) demonstration was completed in 2002. Processing of data from these experiments still continues and additional major joint experiments are planned in future years. Although unlikely to be ready for immediate application, these capabilities hold great promise for application to naval mine warfare.

### Drilling in Extreme Depths

The DeepStar Project is a joint industry technology development project focused on advancing the technologies needed to drill and produce hydrocarbons in water depths up to 10,000 feet. To support this effort, Prof. Kim Vandiver is planning to conduct a deepwater flow-induced vibration experiment. Preliminary tests were conducted in November 2003 at the U.S. Navy's Lake Seneca acoustics facility in upstate New York. After additional testing in this facility, more tests may be conducted in the Gulf of Mexico. This research focuses on high mode number vortex-induced vibration (VIV).



AUV used in GOATS project.

Earlier efforts in this area developed SHEAR7, a VIV response prediction program able to model the response of long cylinders with a variety of boundary conditions, non-monotonic flow profiles and, for the first time, allows the user to completely specify the behavior of the lift coefficient as a function of reduced velocity and response amplitude. This program is continually being upgraded. Atlantia, a consulting firm in Houston, Texas, is the worldwide licensing agent.

### High-Performance Surface Ships

Following the maturity of the development of the SWAN suite of programs for the analysis of steady and unsteady flows past conventional and high-speed vessels, Prof. Paul Sclavounos is investigating the development of optimization algorithms for the selection of minimum resistance and/or maximum performance vessels for operation in calm water and in waves.

This research uses methods from optimal control theory and dynamic programming algorithms either for the selection of optimal hull form shapes or the optimal operation of vessels in stochastic sea states. In calm water, adjoint methods, which have found widespread use and success in aerodynamics and other fields of engineering, are being developed for the determination of optimal shapes of hydrofoils operating under a free surface and for the determination of attributes of high-speed hull forms that generate minimal wakes.

### Renewable Energy Offshore

In collaboration with the National Renewable Energy Laboratory (NREL), research efforts focus on the evaluation of floating offshore wind turbine concepts for the cost-effective generation of electricity in water depths ranging from 50 to 200 meters.

The computer programs FAST and ADAMS, developed at NREL for the analysis of wind turbine aerodynamics and dynamics, are being coupled with the Swim-Motion-Lines software suite, developed at the Laboratory for Ship and Platform Flows at MIT, for the hydrodynamic analysis and response simulation methods of offshore platforms and their extensions for extreme wave conditions. The combined programs are being used to carry out dynamic response simulations of offshore wind turbine concepts supported by two types of floaters: one tethered and the second moored to the seafloor.

### Autonomous Vehicles in Archeology

In the summer of 2002, Prof. Chrys Chryssostomidis was the chief scientist of a 10-day expedition to Argentario, Italy. An autonomous underwater vehicle was used to explore the ocean bottom for archaeological artifacts.

During the Argentario expedition, the ocean bottom near Elba and Argentario was mapped using side scan sonar. At present, the massive amount of data collected during the expedition is being analyzed for images of archaeological interest.

The long-term research objective is to ground truth side scan sonar records with visual images as well as to start building a library of sonar targets with visual comparisons that will help future explorers identify interesting targets.

## Transportation

Waterborne cargo transportation remains the dominant means for delivering goods globally. Economics plays a major role in decisions affecting ship capacity needed and pricing strategies. Prof. Hank Marcus is currently examining the unique features of Hawaii waterborne trade in light of dramatic changes in technology. A report is anticipated in the near future that will evaluate the current situation assessing impacts of regulation and the influence of politics. It will also serve as a case study for future graduate students.

## Computer Solid Modeling

Inconsistent solid models of ships, offshore rig structures, automobiles and airplanes contribute to wasting large efforts and costs in developing designs. The National Science Foundation is sponsoring efforts to study the issues of representation and interrogation of objects bounded by curved surfaces in a computer environment. Prof. Nick Patrikalakis is developing a new generation of robust and efficient algorithms capitalizing on tight interval arithmetic enclosures.

Key to this effort is developing robust and efficient methods for computing the multiplicity and arithmetic values of multiple roots of non-linear polynomial systems. Other research efforts have developed a digital watermark concept to protect copyrighted material available in digital form through such avenues as the Internet.

## Crashworthy Ship Structures

Crashworthiness is an attribute important in the design of automobiles, as well as ships. The Impact and Crash Worthiness Laboratory has developed structures capable of dealing with extreme loads.

Recent research in this area by Prof. Tomasz Wierzbicki deals with the development of blast-resistant adaptive sandwich structures and the fundamental understanding of failure mechanisms in materials.

## Wavemaking Forces on Ships

Various approaches to theoretically determining the wavemaking forces on ships and near-surface underwater vehicles have been conducted for more than 100 years. Viscosity is responsible for both skin friction and viscous wakes, a major component of resistance. Prof. Jerry Milgram, with his doctoral students, is developing a different procedure for the computation of ship-resistance, which includes both wavemaking and viscous effects, along with their interactions. The approach has been successfully applied to the design of aircraft, and is referred to as a two and a half D method. This project is extending the method to non-linear free surface flows around ships. The results will enable the evaluation of ship resistance and pitching moments, as well as side forces for oblique inflows and for vessels with lifting surfaces such as rudders and sailboat fin keels.

For more information, e-mail [oceanbiz@sea-technology.com](mailto:oceanbiz@sea-technology.com)



*Dr. David Burke is a senior lecturer in the Department of Ocean Engineering at MIT. He is responsible for subjects in structural design for ships. Prior to joining the ocean engineering department, he retired from the U.S. Navy, spending most of his career involved with submarine design. Following his naval service,*

*Burke was vice president of engineering at Draper Laboratory until retiring in 1998.*

## Upcoming Conferences

### **IGARSS 2004**

September 20-24, 2004  
Anchorage, Alaska  
[www.igrss04.org](http://www.igrss04.org)

### **SEA Tech Week - International Week for Marine Science and Industry**

October 18-22, 2004  
Brest, France  
[www.oceanicengineering.org](http://www.oceanicengineering.org)

### **4th Ocean Technology Workshop**

October 19-21, 2004  
Newport, Rhode Island  
[www.motn.org](http://www.motn.org)

### **UDT Hawaii 2004**

October 19-21, 2004  
Honolulu, Hawaii  
[www.udtnet.com](http://www.udtnet.com)

### **IEEE Sensors 2004 The 3rd IEEE Conference on Sensors**

October 24-27, 2004  
Vienna, Austria  
[www.ieee.org/sensors2004](http://www.ieee.org/sensors2004)

### **Oceans/Techno-Oceans 2004**

November 9-12, 2004  
Kobe, Japan  
[www.oceans-technoocean2004.com](http://www.oceans-technoocean2004.com)

### **OTC '05**

May 2-5, 2005  
Houston, Texas  
[www.otcnet.org](http://www.otcnet.org)

### **Oceans '05 Europe**

June 20-23, 2005  
Brest, France  
[www.Oceans05Europe.org](http://www.Oceans05Europe.org)

### **Oceans 2005 MTS/IEEE**

September 19-23, 2005  
Washington, D.C.  
[www.oceans2005.org](http://www.oceans2005.org)



**OTO'04 is a joint international convention, combining annual "OCEANS" symposium and exhibition in the US with those of "Techno-Ocean", being held biennially in Japan since 1986. The first "OCEANS" in Asia in its three-decade-long history, tied with the tenth anniversary event of "Techno-Ocean".  
Please join us!**



## **DON'T MISS!**

### **First Joint Event of OCEANS and TECHNO-OCEAN in Japan.**

OCEANS'04 MTS/IEEE / TECHNO-OCEAN'04 (OTO'04) is a joint international convention, combining annual OCEANS conference and exhibition usually held in the USA, with those of TECHNO-OCEAN held biennially in Japan. OTO'04 is the first OCEANS conference in Asia, crossing over the Pacific Ocean.

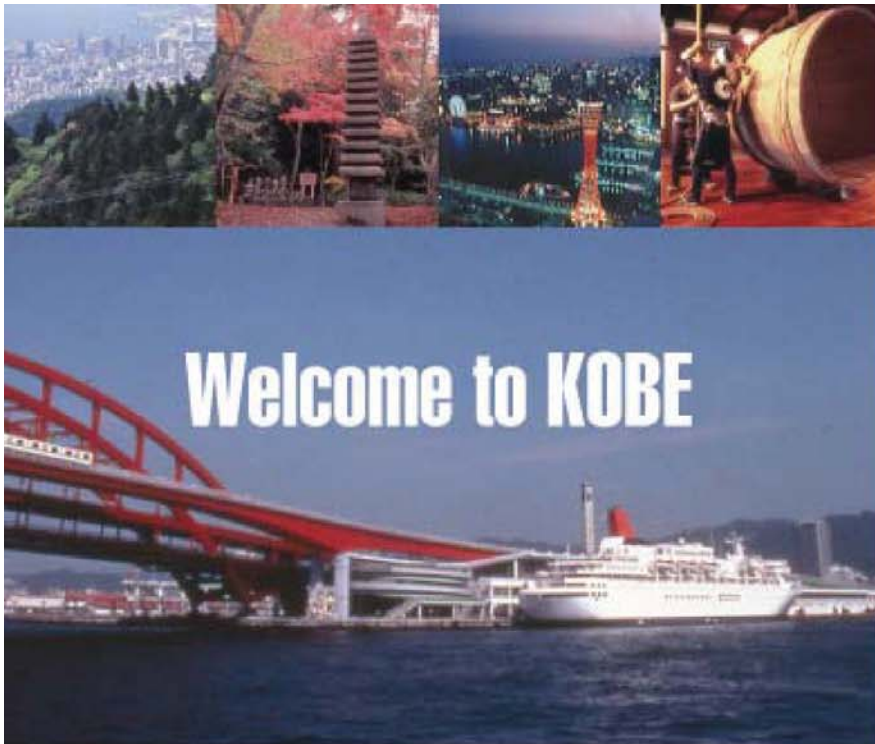
The theme of this international joint convention is "Bridges across the Oceans", which stands for our hope to provide people living in the continents and islands over the world, with bridges to connect each other, to give them chances of face-to-face talks and to exchange information on oceanic activities. You can't miss the largest and most significant convention of its kind.

### **KOBE, JAPAN is waiting for you to come.**

The host city, Kobe, is one of the traditional port cities as well as the advanced oceanic cities in Japan. There are ocean-related organizations in research and academia, industry and public sector, including Japan Coast Guard and others, in Kobe. OTO'04 will offer you a valuable interface arena not only on ocean and coastal science, technology and engineering but also for future ocean business.

Kobe is also a very beautiful city with its sea and mountains. You can enjoy a "million dollar night view" and an easy access to Kyoto and Nara, ancient capitals of Japan. Please come and join us!





## Outline of Kobe

Back in 1868, the Port of Kobe was opened to external trade. Since then Kobe has been developed into one of leading international trade ports in the world. Kobe is home to people from all over the world. In fact the population make-up includes residents from about 100 different countries. The long history of exchange with the outside world has made Kobe people open-minded and warmly hospitable to conference participants.

Nestled between the lush green of the Rokko Mountains to the north and shimmering water of Seto Inland Sea to the south, Kobe is blessed with beautiful natural surroundings. A mild climate together with its natural beauty makes Kobe an ideal venue for conventions.

## Visitor attractions

Major visitor attractions in the city include Kobe Maritime Museum, Akashi Strait Bridge, Sake (Japanese rice wine) Brewery Museum and Arima hot spring. There are also quite a few cruise ships you can choose from.

Kobe is close to historical cities such as Kyoto, Nara and Himeji. Kyoto and Himeji can be reached in an hour by train while Nara in about two hours.



Kobe Convention Center



Kobe International Exhibition Hall



## Access to Kobe

- ☉ **From Kansai International Airport**  
65 minutes to Sannomiya  
(down town Kobe) by limousine bus.
- ☉ **From Osaka (Itami) International Airport**  
40 minutes to Sannomiya  
(down town Kobe) by limousine bus
- ☉ **From Tokyo**  
2 hours and 47 minutes to Shin-Kobe  
Station by Shinkansen bullet train.



## CHAPTER CHAIRMEN

### Boston

JOHN W. IRZA  
Sygnus Technology Inc.  
Arlington, MA  
781 648 2144  
781 641 9974 (Fax)  
jirza@sygnus.com

### Canadian Atlantic

FERIAL EL-HAWARY  
61 Bay View Road  
Halifax Nova Scotia  
Canada B3M 1N8  
902 443 2400  
902 445 5110 (Fax)

### France

RENE M. GARELLO  
GET - ENST Bretagne  
CNRS FRE 2658 TAMCIC - Equipe TIME  
Dept Image et Traitement de l'Information  
Technopôle Brest Iroise - CS 83818  
29238 BREST Cedex - FRANCE  
(33) 98 00 13 71  
(33) 98 00 10 98 (Fax)

### Houston/Galveston Bay

AL WILLIAMS  
FSSL Inc.  
525 Julie Drive  
Sugar Land, TX 77478  
713 240 1122 ext 214  
713 240 0951 (Fax)

### Hawaii

MARK ROGNSTAD  
University of Hawaii at Manoa  
School of Ocean and Earth Sciences and  
Technology  
Hawaii Institute of Geophysics and Planetology  
1680 East-West Road Post 816B  
Honolulu, HI 96822  
808 956 8712  
808 956 6530 (Fax)  
mark\_rogstad@ieec.org

### Japan

JUNZO KASAHARA  
Earthquake Research Institute  
University of Tokyo  
1-1-1, Yayoi, Bunkyo  
Tokyo 113-0032 Japan  
+81 3 5841 5713  
+81 3 5689 7234 (Fax)  
kasa2@eri.u-tokyo.ac.jp

### Norway

DR. OLAV EGELAND  
Department of Engineering Cybernetics, NTNU  
O.S. Bragstad plass 2D  
N-7491 Trondheim, Norway  
47 73 59 43 59  
47 73 59 43 99 (Fax)  
Olav.Egeland@itk.ntnu.no

### San Diego

DANIEL D. STERNLICHT  
ORINCON Defense  
4770 Eastgate Mall  
San Diego, CA 92121  
858 795 1283  
858 795 8532 (Fax)

### Seattle

SHERI L. REES  
Enginuity Development Networks, Inc.  
116 NW 130th  
Seattle, WA 98177  
206 440 1455  
206 440 1438 (Fax)  
s.l.rees@ieec.org

### Taipei, Taiwan

DR. SHENG-WEN CHENG  
Professor  
Dept. of Engineering Science & Ocean  
Engineering  
National Taiwan University  
No. 1, Sec. 4, Roosevelt Road, Taipei, TAIWAN  
886 2 23625470 Ext. 260 (Office)  
886 937 049982 (Mobile)  
886 2 23929885 (Fax)  
niccheng@ccms.ntu.edu.tw

### Washington D.C./No. Virginia

JAMES BARBERA  
13513 Crispin Way  
Rockville, MD 20853  
301 460 4347  
301 871 3907 (Fax)

### Victoria

JAMES S. COLLINS  
Dept. of Elec. &  
Comp. Engineering  
University of Victoria  
P.O. Box 3055  
Victoria, B.C. CANADA V8W 3P6  
(604) 721-8610; (604) 721-6052 (FAX)  
j.s.collins@ieec.org

## OES Journal Associate Editors

### ARTHUR B. BAGGEROER

Dept. Ocean Eng.-Rm. 5-204  
Mass. Inst. Technol.  
Cambridge, MA 02139  
+1 617 253 4336  
abb@arctic.mit.edu

### D. RICHARD BLIDBERG

Autonomous Undersea  
Systems Institute  
86 Old Concord Turnpike  
Lee, NH 03924  
+1 603 868 3221  
Fax: +1 603 868 3283  
blidberg@ausi.org

### BRIAN CALDER

Center for Coastal and Ocean Mapping  
University of New Hampshire  
24 Colovos Road  
Durham NH 03824 USA  
Tel: (603) 862-0526  
Fax: (603) 862-0893  
email: brc@com.unh.edu

### WILLIAM M. CAREY

The Kerry Group LLC  
79 Whippoorwill Rd.,  
Old Lyme, CT 06371  
+1 860 434 6394  
kerrygtp@ctol.net

### CHRISTIAN DE MOUSTIER

Center for Coastal and Ocean Mapping  
Chase Ocean Engineering Lab  
University of New Hampshire  
24 Colovos Road  
Durham, NH 03824-3525  
Phone: 603-862-3434  
FAX: 603-862-0839  
email: cpm@ieec.org

### JOHN E. EHRENBERG

Boeing Phantom Works  
P. O. Box 3999  
MC 84-41  
Seattle, WA 98124-2499  
+1 253 773 1332  
john.e.ehrenberg@boeing.com

### FERIAL EL-HAWARY

B.H. Engineering Systems Ltd.  
61 Bayview Road  
Halifax, Nova Scotia B3M 1N8  
Canada  
tel: 902-443-2400  
fax: 902-445-5110  
email: F.El-harwary@ieec.org

### DAVID M. FARMER

Institute of Ocean Sciences  
P. O. Box 6000, 9860 West Saanich Rd.  
Sidney, BC V8L 4B2 Canada  
+1 250 363 6591  
Fax: +1 250 363 6798  
dmf@ios.bc.ca

### RENE GARELLO

Telecom Bretagne  
Dpt. ITI BP 832  
29285 Brest Cedex France  
33 2 98 00 13 71  
Fax: 33 2 98 00 10 98  
rcne.garello@enst-bretagne.fr

### MALCOLM L. HERON

Physics Dept.  
James Cook Univ.  
Townsville, Queensland 4811  
Australia  
61 77 81 4127

### JOHN J. LEONARD

Ocean Engineering Department  
Room 5-422  
Mass. Inst. Technol.  
77 Massachusetts Ave.  
Cambridge, MA 02139  
+1 617 253 5305  
Fax: +1 617 253 8125  
jleonard@mit.edu

### TAMAKI URA

Underwater Technology Research Center  
Institute of Industrial Science  
University of Tokyo  
4-6-1, Komaba  
Meguro, Tokyo 153-8505 Japan  
+81-3-5452-6487  
ura@iis.u-tokyo.ac.jp

### HISAAKI MAEDA

Institute of Industrial Science  
University of Tokyo  
7-22-1, Roppongi, Minatoku  
Tokyo 106, Japan  
81 3 3402 6231 X2255  
Fax: 81 3 3402 5349  
maedah@iis.u-tokyo.ac.jp

### ARYE NEHORAI

Dept. Elect. Eng. and Computer Sci.  
Univ. of Illinois at Chicago  
851 S. Morgan St.,  
Rm. 1120 SEO  
Chicago, IL 60607-7053  
+1 312 996 2778  
Fax: +1 312 413 0024  
nehorai@eecs.uic.edu

### JOHN D. PENROSE

Centre for Marine Science and  
Technology  
Curtin Univ, Kent SL Bentley,  
Western Australia 6102  
Australia 61 9351 7380  
tpenrosej@cc.currin.edu.au

### JOHN POTTER

Head, Acoustic Research Laboratory  
TMSI and Elect. Eng. Dept.  
National Univ. of Singapore  
10 Kent Ridge Crescent  
Singapore 117596  
Fax: 65 874 2129  
Fax: 65 874 8325  
johnp@arl.nus.edu.sg

### ROBERT C. SPINDEL

Applied Physics Lab.  
Univ. of Washington  
1013 N.E. 40th St.  
Seattle, WA 98105  
+1 206 543 1310  
spindel@apl.washington.edu

### RICHARD STERN

Applied Research Lab.  
Penn State Univ.  
P. O. Box 30  
State College, PA 16804  
+1 814 865 6344  
rs@arl.vax.arl.psu.edu

### DR. DAJUN (DJ) TANG

Applied Physics Laboratory,  
University of Washington  
1013 NE 40th Street,  
Seattle, WA 98105  
(206) 543-1290

### ARTHUR B. BAGGEROER

Arctic/Antarctic Oceanic  
Engineering, Information and Processing  
of Acoustic and Electromagnetic  
Phenomena

### D. RICHARD BLIDBERG

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AUV's, ROV's, Autonomous Systems,  
Unmanned Vehicles, Intelligent Systems,  
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Bathymetry, Surveys, Mapping, Remote  
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thetic Aperture Sonar, Acoustic Commu-  
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