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2012-10-01

Research Naval Postgraduate School, v.4, no. 14, October 2012

Monterey, California, Research and Sponsored Programs, Office of the Vice President and Dean of Research, Naval Postgraduate School (U.S.)

RESEARCH AT NPS

CDR Stuart R. Blair, USN, received a doctorate in mechanical engineering at the September graduation for research in the field of lattice Boltzmann methods (LBM) for fluid-structure interaction. The use of LBM for fluid flow and its coupling with finite-element method (FEM) structural models for fluid-structure interaction (FSI) is investigated. CDR Blair's advisor was **Distinguished Professor**

Young W. Kwon, Mechanical and Aerospace Engineering.

A body of high performance LBM software that exploits graphic processing unit (GPU) and multiprocessor programming models is developed and validated against a set of two- and three-dimensional benchmark problems. Computational performance is shown to exceed recently reported results for single-workstation implementations over a range of problem sizes. A mixed-precision LBM collision algorithm is presented that retains the accuracy of double-precision calculations with less computational cost than a full double-precision implementation.

FSI modelling methodology and example applications are presented along with a novel heterogeneous parallel implementation that exploits

RESEARCH UPDATES

The beginning of the fiscal year was a starting point for several new assignments and a reorganization in the Vice President/Dean of Research Office (VP/DoR). The four units under the dean are outlined below.

Research and Sponsored Programs Office

Danielle Kuska, Director

- Sponsored program administration, NPS institutionally funded research, fellowship programs (NRC, NREIP, ESEP), technology transfer (CRADAs, work for others, MOUs/MOAs), grants, research publications

Compliance, Analysis, and Systems

Dr. Ira Lewis, AVP for Research Administration

- Human-Research Protection Office, systems/web support, export control liaison, post-award administration, research opportunities

Graduate Writing and Thesis Support

Dr. Sandi Leavitt, Director

- Thesis processing, international student editing support, graduate writing center (development stage)

Research Safety and Export Control

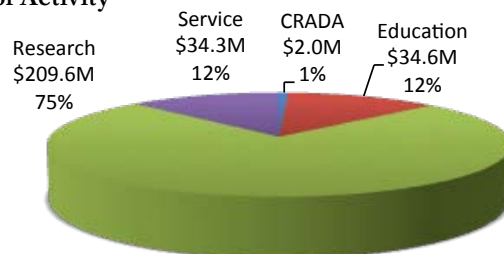CAPT Rod Abbott, USN, Military Associate Dean and Director

- Radiation safety, laser safety, electrical/mechanical/chemical safety, industrial hygiene, aviation safety

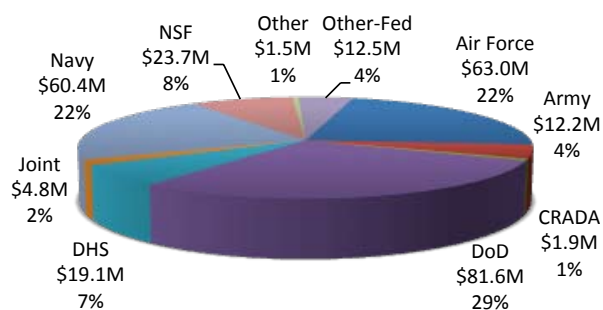**Distinguished Professor R. Kevin Wood** was appointed Associate Dean of Research effective 1 October.

We look forward to improving support to our faculty and students. Suggestions/comments are welcome and can be offered at http://intranet.nps.edu/ResAdmin/SuggestionBox/SuggestionForm.html or research@nps.edu.

SPONSORED PROGRAMS STATUS, SEPTEMBER 2012

By Type of Activity

Research $209.6M 75%
Service $34.3M 12%
CRADA $2.0M 1%
Education $34.6M 12%

By Sponsor

Navy $60.4M 22%
NSF $23.7M 8%
Other $1.5M 1%
Other-Fed $12.5M 4%
Air Force $63.0M 22%
Army $12.2M 4%
CRADA $1.9M 1%
DoD $81.6M 29%
DHS $19.1M 7%
Joint $4.8M 2%

By School

Institutes & Other $57.9M 21%
SIGS $26.3M 9%
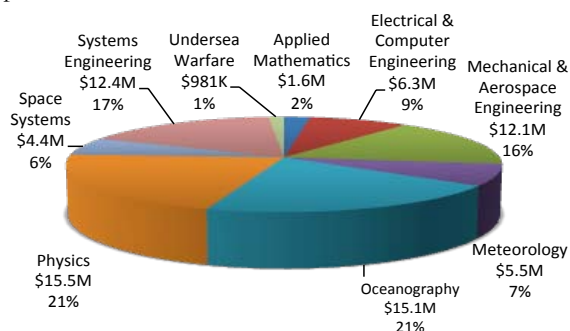Academic Affairs $10.2M 4%
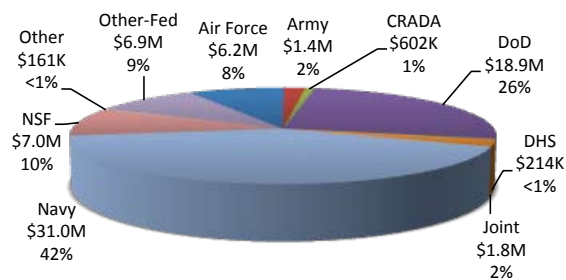GSBPP $15.6M 6%
GSEAS $74.1M 26%
GSOIS $96.5M 34%
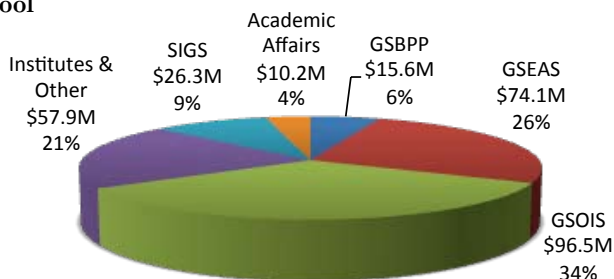
Graduate School of Engineering and Applied Sciences

Funds available to date: $74M
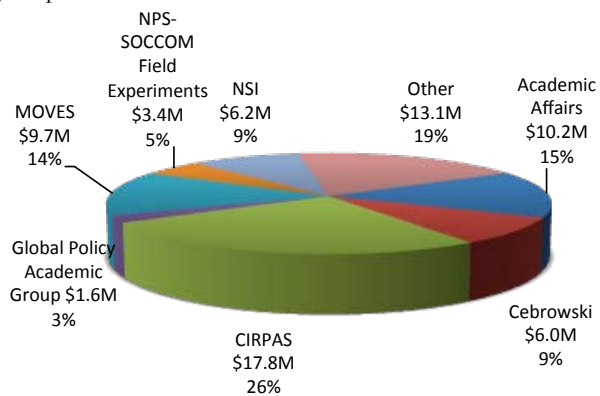
By Department

By Sponsor

Projects funded in September

- DARPA Active Authentication, *Jim Scrofani, EC* (DARPA)
- Cross-Domain, Multi-Int (CDMI) Laboratory, *Jim Scrofani, EC* (SAF)
- Spacecraft Design, *Brij Agrawal, MAE* (SAF)
- ACAF: Electromagnetic Ducting Climatology Enhancements, *Paul Frederickson, MR* (FNMOC)
- Characterization and Classification of Marine Mammal Vocalizations, *Curt Collins, OC* (CNO)
- Shipboard Monitoring of the California Current System Off Central California, *Curt Collins, OC* (NOAA)

- Department of Energy and International FEL Scientific Collaboration, *Bill Colson, PH* (ONR)
- Novel Battery Management System With Distributed Wireless Sensors, *Sebastian Osswald, PH* (ARPA-E)
- Unmanned Underwater Vehicle Integration with Submarine Force and Directed Energy Weapons, *Chris Eagle, SE* (OPNAV)
- Body of Knowledge and Curriculum to Advance Systems Engineering, *Dave Olwell, SE* (OSD)
- Systems Engineering Short Courses, *Wally Owen, SE* (Various)
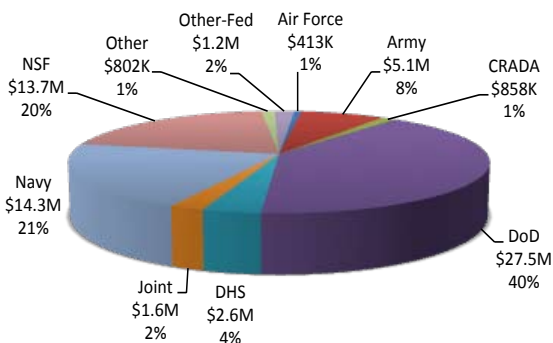- Naval SE Guide Technical Writing Project, *Cliff Whitcomb, SE* (NAVSEA and NSWC-Carderock Division)

Research and Education Institutes, Centers, and Other

Funds available to date: $68.1M

By Department

By Sponsor

Projects Funded in September

- Developing Institutional Transparency by Building Integrity: Transparency Seminar, *Alan Howard, USPTC* (Department of State)
- Technical Support for Collaborative Sensor Visualization Capability, *Alan Jaeger, NSI* (NAWC-Weapons Division)

- GIS Program and Technical Oversight, *Warren Yu, Cebrowski* (FNMOC)
- Modeling Updates to Armed Aerial Scout Operational Effectiveness Analysis, *Arnie Buss, MOVES* (TRAC Monterey)
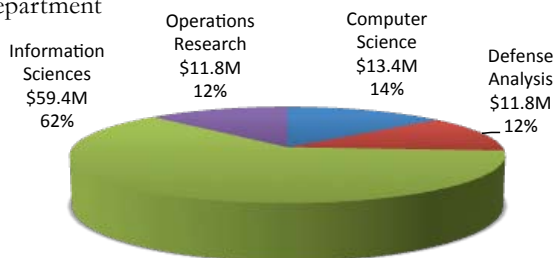- WTI 1-13, *Bob Bluth, CIRPAS* (USMC–MAWT)

ANNUAL ACCOUNTABILITY TRAINING

The completion of accountability modules for 1) fiscal law, 2) stewardship for the principal investigator/project director (PI/PD), and 3) protection of human subjects in research is required for PIs/PDs, co-PIs/PDs, SPFAs, and individuals "assigned" responsibilities on sponsored-project accounts. The modules are online at https://www.nps.edu/Technology/WebBasedTraining/Auth/modules/Research/index.asp. Funding cannot be released to RID until modules are completed.

Graduate School of Operational and Information Sciences

Funds available to date: $96.5M

By Department

Information Sciences $59.4M 62%

Operations Research $11.8M 12%

Computer Science $13.4M 14%

Defense Analysis $11.8M 12%

By Sponsor

CRADA $390K <1%

Army $2.9M 3%

DoD $19.1M 20%

DHS $1.1M 1%

Joint $1.1M 1%

Navy $9.7M 10%

NSF $2.9M 3%

Other $410K 1%

Other-Fed $3.0M 3%

Air Force $55.6M 58%
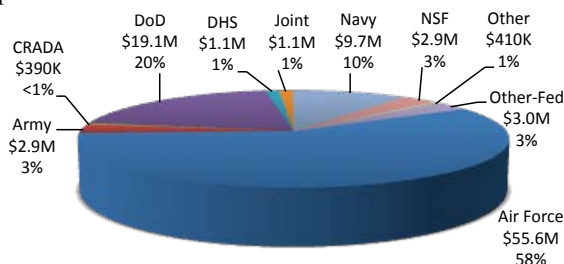
Projects funded in September

- NeTS: User-Centric Network Measurement, *Robert Beverly, CS* (NSF)
- High-Frequency Active Internet Topology Mapping, *Robert Beverly, CS* (DHS)
- Developing Materials to Teach Technical Privacy Auditing with Digital Forensics Tools and Realistic Digital Forensic Datasets, *Simson Garfinkel, CS* (NSF)
- Detecting Threatening Insiders with Lightweight Media Forensics, *Simson Garfinkel, CS* (DHS)
- Methodology for Assessment of Security Properties, *Cynthia Irvine, CS* (DHS)
- CORE Lab Instructional Program for International Students, *Sean Everton, DA* (Combating Terrorism Fellowship Program)
- CTFP Global ECCO Program, *Michael Freeman, DA* (Counterterrorism Fellowship Program)

- Use Centric Cloud (UC2), *Dan Boger, IS* (USAF Advanced Capabilities Office)
- Flexible Architecture Sensor Topology License Plate Recognition (FAST LPR), *James Ehlert, IS* (NSWC-Dahlgren Division)
- Field Information Support Tool (FIST), *James Ehlert, IS* (NSWC-Dahlgren Division)
- Purple Rain, *Bill Roeting, IS* (USAF Adv. Capabilities Office)
- Space Systems Certificate Program, *Joe Welch, IS* (Various)
- Innovative Methods for Assessing Domestic Nuclear Security Risks, *David Alderson, OR* (LANL)
- FDA Analysis Support, *Lee Ewing, OR* (USA ASC)
- Statistical Training and Research Support to JITC, *Bob Koyak, OR* (JITC)
- Factor Screening in High-Dimensional System of System Simulation, *Tom Lucas, OR* (ARL)
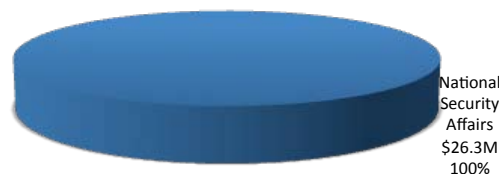
School of International Graduate Studies

Funds available to date: $26.3M

Projects funded in September:

- FY13 Regional Security Education Program, CAPT Bernie Wang, USN (U.S. Fleet Forces Command)

By Sponsor

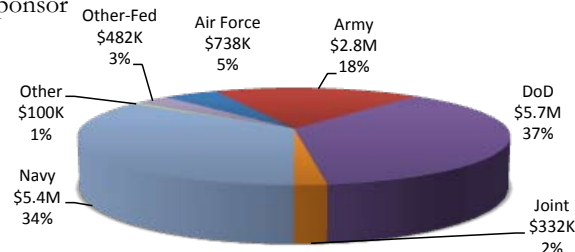National Security Affairs $26.3M 100%

Graduate School of Business and Public Policy

Funds available to date: $15.6M

Projects funded in September:

- Civilian EMBA Program, *Bill Hatch* (Various)
- Analysis of Comprehensive Soldier Fitness Program, *Yu-Chu Shen,* (Army Deputy Chief of Staff, G3/5/7)
- Small-Business in DoN Procurement and R&D, Better Buying Power, *Keith Snider* (Office of Small Business Programs)

By Sponsor

Other-Fed $482K 3%

Air Force $738K 5%

Army $2.8M 18%

Other $100K 1%

Navy $5.4M 34%

DoD $5.7M 37%

Joint $332K 2%

Please submit your faculty and research news (published articles, conference proceedings, conference presentations, books, honors received, accomplishments, milestones, etc.) to research@nps.edu.
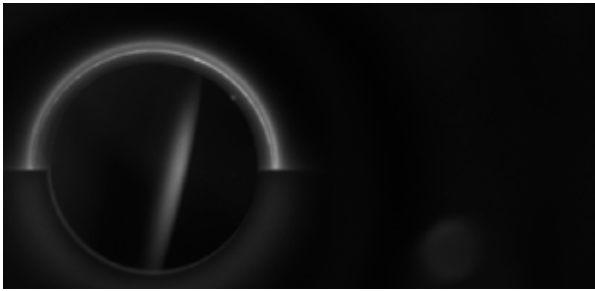
FIRST ELECTRON BEAM FROM THE MARK I SUPERCONDUCTING QUARTERWAVE RF GUN AT NPS

The physics department's beam-physics group scored a first in September with the initial observation of an electron beam generated by the Mark I superconducting quarterwave RF gun. The quarterwave cavity is fabricated of niobium, a metal that demonstrates superconducting characteristics when cooled to near the temperature of liquid helium (helium boils at 4.2° Kelvin, equivalent to -269° Celsius or -452° Fahrenheit). When superconducting, the walls of the niobium cavity have essentially zero resistance to the flow of electrons, allowingh accelerator cavities that can produce very high electric fields for modest inputs of RF power, greatly increasing system efficiency.

The photographs below show the Mark I quarterwave gun and an image of the electron beam cross section as projected on a 1-inch diameter crystalline YAG (yttrium aluminum garnet) screen, approximately a meter from the gun cathode. Energetic electrons cause the YAG crystal to fluoresce, emitting light in the visible realm. Light emitted toward the viewer through the polished surface of the crystal produces an image of the electron-beam cross-section. The initial beam (below left) appears as a flattened ellipse from upper right to lower left. Light captured in the plane of the disk by internal reflection is guided to the edge of the crystal and scatters from the unpolished edge, resulting in the glowing semicircle at the top; the scattered light at the bottom of the circle is blocked by the Teflon disk holder.

The Mark I gun is the first of a planned series of superconducting rf cavities intended to support research in directed-energy production with potential applications in the development of the next generation of close-in fleet air defense systems. The research is being conducted as a collaboration between the NPS Beam Physics Group and Niowave Inc., with funding by the Office of Naval Research Directed Energy Program and High-Energy Laser Joint Technology Office.

Above: YAG crystal image of electron beam from quarterwave cavity
Right: Mark I superconducting quarterwave gun underway


## ENERGY-MANAGEMENT SYSTEMS DEMONSTRATED

Associate professors **Giovanna Oriti** and **Alex Julian** have completed the design and first demonstration of an energy-management system (EMS) in the ECE power laboratory. An EMS optimizes the use of energy sources and energy storage systems in microgrids and provides an intelligent interface with the main grid when the microgrid is connected. The EMS is developed on a digitally controlled power-electronics system that can provide power-flow metering and control, fault detection and correction, reliability improvements, enhanced electrical-system security, and other capabilities. It includes a power converter module, an FPGA controller, a USB interface to communicate with a PC/Web server and voltage/current sensors.

Three MSEE students, **LT Nathan Peck, USN, Capt. Ryan Kelly USMC,** and **LT Andrew Metzcus USN**, are contributing to this research by setting up physics-based models and hardware demonstrations for different scenarios related to the DoD energy-reduction efforts.
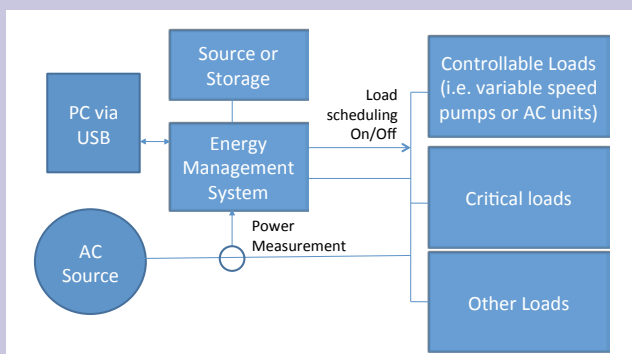
EMS interface with the main grid and microgrid
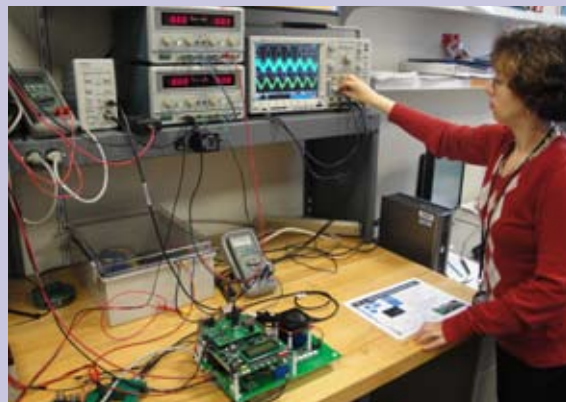
Associate Professor Oriti demonstrates equipment

DOCTORAL STUDENTS, *continued from page 1*

task-level parallelism and workload sharing between the central processing unit (CPU) and GPU that allows significant speedup over other methods. Multi-component LBM fluid models are explicated and simple immiscible multi-component fluid flows in two-dimensions are presented. These multi-component fluid LBM models are also paired with structural dynamics solvers for two-dimensional FSI simulations. To enhance modeling capability for domains with complex surfaces, a novel coupling method is introduced that allows use of both classical LBM (CLBM) and a finite element LBM (FELBM) to be combined into a hybrid LBM that exploits the flexibility of FELBM while retaining the efficiency of CLBM.

CDR Blair is a permanent military professor and will be stationed at the US Naval Academy to teach mechanical engineering.

CDR Jeffrey C. Woertz, USN, was awarded a doctorate in mechanical engineering for his research in redistribution mechanisms and quantification of homogeneity in friction-stir welding and processing of an aluminum–silicon alloy. Woertz's advisor was **Distinguished Professor Terry Mc-Nelley,** Mechanical and Aerospace Engineering.

CDR Jeffrey C. Woertz, USN

The uniformity (homogeneity) of nondeforming particle distributions in a cast alloy's microstructure is highly important in controlling the material's strength, ductility, and fatigue resistance. Friction stir processing (FSP) is an effective post-casting technique for redistributing constituent material into a more homogeneous state, although the mechanism of particle transport remains unclear and no concise method exists for quantifying and comparing homogeneity.

Advective and diffusive redistribution processes are investigated in Al-7% Si and AA356 to determine the magnitude and rate of particle transport within a high-temperature deforming metallic matrix. High temperature deformation experiments were conducted via Equal Channel Angular Processing (ECAP), hot rolling, and FSP. Processed material was then examined using optical/scanning electron microscopy. The experimentally observed particle transport was compared against modeled and analytically predicted transport, while microstructural homogeneity was measured and compared using digital image analysis and a six-parameter variance model.

FSP redistribution is proposed to be the result of a matrix shear/layer sliding advective mechanism, the probable result of fine layers of material (ranging from 5 to 15 μm in thickness) that are sheared and rotated by the tool's pin face. Diffusive processes have only a small role in FSP redistribution. FSP is shown to increase homogeneity by a factor of ~5 (compared to as-cast), increasing linearly with tool RPM over the measured range.

CDR Linda Craugh, USN, was awarded a doctorate in mechanical engineering for her work in coupled finite element and cellular automata methods for analysis of composite structures in an acoustic domain. Her research examines various computational

CDR Linda Craugh, USN

techniques to analyze dynamic response and failure of sandwich composite materials subject to fluid-structure interaction characterized by an acoustic field or the propagation of velocity potential according to the wave equation. A displacement-only plate finite element is developed and implemented using discontinuous Galerkin (DG) methodology; its accuracy compares favorably to both theory and continuous Galerkin methods. Several approaches to analyzing debonding failure between skin and core layers of sandwich composite structures are demonstrated and evaluated; partial disconnection between neighboring elements at a debonding site shows good qualitative agreement with known physical phenomena. A hybrid finite-element–cellular automata (FE+CA) approach to modeling an acoustic field with nonreflecting boundary conditions is presented, validated numerically, and favorably compared with experimental results. The FE+CA fluid model is then combined with the DG structural model to simulate fluid-structure interaction; this combined model compared favorably with experimental results for the strain field of laminated plates subject to low-velocity impact. Each technique addressed shows promise for flexible and accurate modeling of failure initiation and propagation in sandwich and laminate composites subject to fluid-structure interaction with moderate computational costs.

CDR Craugh was advised by **Distinguished Professor Young W. Kwon,** Mechanical and Aerospace Engineering..

LTC Jonathan Alt, USA

"Learning From Noisy and Delayed Rewards: The Value of Reinforcement Learning to Defense Modeling and Simulation," is the title of **LTC Jonathan Alt, USA's,** doctoral dissertation on modeling and simulation of military operations. Operations M&S requires human behavior models capable of learning from experience in complex environments where feedback on action quality is noisy and delayed. Alt examines the potential of reinforcement learning, a class of artificial-intelligence learning algorithms, to address this need. A novel reinforcement learning algorithm that uses the exponentially weighted average reward as an action-value estimator is described.

Empirical results indicate that this relatively straightforward approach improves learning speed in benchmark environments and challenging applied settings. Applications of reinforcement learning in the verification of the reward structure of a training simulation, improvement in performance of a discrete-event simulation scheduling tool, and in enabling adaptive decision-making in combat simulation are presented. To place reinforcement learning within the context of broader models of human information processing, a practical cognitive architecture is developed and applied to the

PASCC REPORT RELEASED

The Project on Advanced Systems and Concepts for Countering Weapons of Mass Destruction (PASCC), at the NPS Center on Contemporary conflict, has released its 2012 annual report, available at www.nps. edu/Academics/ Centers/CCC/ PASCC/Publications/2012/ PASCC%20AR%202012.pdf. The document covers the organization's mission, leadership, accomplishments, projects, and budget.

PASCC research links social science and technical domains to investigate and anticipate WMD capabilities, intentions, and countermeasure five to twenty years out.

Project success stems from research objectivity, accountability, and high-quality products that have immediate value to the government and public. The director of PASCC is **Professor Clay Moltz**; executive director is Assistant Professor **Michael Malley** and program manager is **Meghan Rasmussen.**

SE CAPSTONE STUDENTS VISIT KAUAI POWER PLANT

NPS systems-engineering students visited Kapaia power plant on Kauai as part of their capstone project on biofuels. The plant diverts CO_2 from its flue to the algae plant next door, decreasing greenhouse gas emissions and increasing algae yield. The students are part of a group of thirty-seven doing a system-of-systems analysis and architecture for algae-based biofuels for naval aviation in Hawaii. The project is supported by J8, PACOM.

In hard hats: Ken Daubert, plant supervisor, Patrick Knowles, NAVSEA Carderock, David Thomas, NAVAIR China Lake, Karolyn Campbell, NAVAIR Orlando, LCDR Joseph Kamara, USN, Mayport. Photo: Professor Dave Olwell

DOCTORAL STUDENTS, *continued from page 5*

representation of a population within a conflict area. These varied applications and domains demonstrate that the potential for the use of reinforcement learning within modeling and simulation is great.

LTC Alt's advisor was **Associate Professor Christian Darken,** Computer Science. Alt is currently assigned as the director of TRADOC Analysis Center, Monterey.

Adam Yingling received a Ph.D. in astronautical engineering as a Science, Mathematics, and Research for Transformation (SMART) scholar. **Distinguished Professor Brij Agrawal** was advisor.

Adam Yingling

Yingling's dissertation, "Integrated Structures Optics and Controls of the Segmented Mirror Telescope," investigates the development of space-based, segmented mirror systems, a subject of interest to the Department of Defense. Such technology will address current operational needs, as well as reduce cost and risk through the use of adaptive optics. An adaptive control system is required for these systems to correct for vibrations that degrade the system performance to below acceptable levels. This work addressed this problem by first quantifying the optical effect of vibration in terms of wavefront error (WFE); second, damping the modes of vibration that contribute to WFE; and third, creating a dynamic state-space model for use in high-bandwidth closed-loop control.

This work revealed that under ambient conditions, the WFE produced solely by vibration was on the order of 1 micron. Disturbances of this magnitude are outside the dynamic range of most onboard instrumentation, including the Shack–Hartmann and phase diversity sensors, and require dampening. As a part of this work, new theoretical work used to optimize system damping was experimentally validated. Final testing showed that the results of this effort reduced vibrations by 80%, lowering the WFE to below 200 nanometers and allowing on-board instrumentation to be used as designed. Finally, this work developed two state-space models for use in closed-loop control; one model for quasi-static control and the other for dynamic control. Both models were developed using integrated design methodology that incorporated industry accepted structural, optical, and control design tools. These tools included powerful software packages like NASTRAN, Code V, MACOS, and Matlab, as well as newer packages like Sigfit and CVtoolkit. The advantages of using one tool over another are also discussed.

Yinging is currently being placed by the SMART program office in a Department of Defense position.

APPLIED MATHEMATICS

J. F. Kelly, .F. X. Giraldo, Continuous and Discontinuous Galerkin Methods for a Scalable Three-Dimensional Nonhydrostatic Atmospheric Model: Limited-Area Mode, *Journal of Computational Physics,* Vol 231 No. 24, Pages 7988-8008

Anand, P., Escuadro, H., **Gera, R.,** Hartke, S. G., & Stolee, D. (2012). "On the Hardness of Recognizing Triangular Line Graphs." *Discrete Mathematics,* 312(17), 2627-2638.

S. Marras, **J.F. Kelly, F.X. Giraldo,** M. Vázquez, Variational Multi-scale Stabilization of High-Order Spectral Elements for the Advection–diffusion Equation, *Journal of Computational Physics,* Vol 231 No. 21, Pages 7187-7213.

Saša Gaberšek, **Francis X. Giraldo**, James D. Doyle, "Dry and Moist Idealized Experiments with a Two-Dimensional Spectral Element Model," *Monthly Weather Review,* Vol 140, Issue 10, 3163–3182.

CENTER FOR DECISION, RISK, CONTROLS AND SIGNALS INTELLIGENCE (DRCSI)

Mohsen Tadi and **S. S. Sritharan,** "Identification of Far Field Electric Field Based on Near Field Distributed Measurements," *International Journal of Computational and Applied Mathematics,* Vol. 7, No. 3, pp. 235-249, (2012).

A 48-page manuscript by NRC Fellow Pani Fernando and **S. S. Sritharan** entitled " Nonlinear Filtering of Stochastic Navier-Stokes Equation with Ito-Levy Noise" has been accepted for publication in the *Journal of Stochastic Analysis and Applications,* September 2012.

A 38-page manuscript by former NRC Fellow Sakthivel Kumarasamy and **S. S. Sritharan,** "Martingale Solutions to Stochastic Navier-Stokes Equation with Levy Noise" has been accepted for publication in *Evolution Equation and Control Theory,* September 2012.

S. S. Sritharan will deliver a colloquium on "The Millennium Prize Problem for the Navier-Stokes Equation and its Probabilistic Counter Part," in the Department of Mathematics at Georgia Institute of Technology.

As an initiative to build Cyber Enabled Electronic Warfare (CE2W) at NPS, DRCSI will host Sudharman Jayaweera of the electrical engineering department at the University of New Mexico. Professor Jayaweera will give a colloquium on November 1, 2012 in the NPS ECE department entitled "Radiobots: Autonomous Cognitive Radios for Jammer-Resistant SATCOM and SIGINT" and engage with NPS students and faculty in cyber and electronic warfare.

DRCSI will host statistician Jeyaram Sethuraman of Florida State University to stimulate interdepartmental discussions on nonparametric Bayesians and Dirichlet priors. This subject has important applications in Navy disciplines such as cognitive radios and radars, natural-language processing, data-clustering analysis, anomaly detection in cyber networks, etc. Professor Sethuraman will give a colloquium in the operations research department in coming months.

K. R. Rajagopal, a distinguished professor in five departments at Texas A & M, will visit NPS in late November to give a seminar entitled "Invitation to Modeling in Biomedicine, Biomechanics, and Mechanobiology," as part of DRCSI's initiative to stimulate biomedical research at NPS. Rajagopal edits 30 professional journals in engineering and the sciences.

COMPUTER SCIENCE

Schwamm, R., & **Rowe, N. C.** (2012). "The Android Smartphone as an Inexpensive Sentry Ground Sensor." *Unattended Ground, Sea, and Air Sensor Technologies and Applications* XIV, 8388, 83880O.

Xiao, Y., Peng, M., **Gibson, J., Xie, G. G.,** Du, D., & **Vasilakos, A. V.** (2012). "Tight Performance Bounds of Multihop Fair Access for MAC Protocols in Wireless Sensor Networks and Underwater Sensor Networks." *IEEE Transactions on Mobile Computing,* 11(10), 1538-1554.

DEFENSE ANALYSIS

Professor Dorothy Denning was inducted into National Cyber Security Hall of Fame on Wednesday, October 17, at the Four Seasons Hotel, Baltimore. The Hall of Fame is an organization of companies and organizations committed to recognizing individuals who played key roles in the development of the cybersecurity industry.

Professor Denning

DEFENSE RESOURCES MANAGEMENT INSTITUTE

Hansen, J. K. (2012). "The economics of optimal urban groundwater management in southwestern USA." *Hydrogeology Journal*, 20(5), 865-877.

Slootmaker, L.A., Regnier, E.D., Hansen, J.A., & **Lucas, T.W.** "UserFocus and Simulation Improve Predictions of Piracy Risk." *Interfaces.* Forthcoming.

ELECTRICAL AND COMPUTER ENGINEERING

N. Paepolshiri, **P. E. Pace** and **D. C. Jenn**, "Extending the unambiguous range of polyphase P4 CW radar using the robust symmetrical number system," *IET Radar, Sonar and Navigation,* September 2012.

M. R. Arvizo, **J. Calusdian**, K. B. Hollinger and **P. E. Pace,** "Robust symmetrical number system preprocessing for minimizing encoding errors in photonic analog-to-digital converters," *Optical Engineering* Vol. 50, No. 8, August 2011.

M. Magalhaes, T. E. Smith, P. E. Pace, "Adaptive Node Capability to Assess the Characteristic Tempo in a Wireless Communication Network, IEEE Wireless Communications and Networking Conference, Paris, France, April 1–4, 2012. (WCNC 2012).

T. O. Gulum, A. Y. Erdogan, T. Yildirim, and **P. E. Pace**, "A Parameter Extraction Technique for FMCW Radar Signals using Wigner–Hough–Radon Transform," IEEE AESS Radar Confer-

ence, Atlanta, GA, May 7–11, 2012. (RadarCon 2012).

GRADUATE SCHOOL OF BUSINESS AND PUBLIC POLICY

King, C. L. (2012). "Reverse outlining: A method for effective revision of document structure." *IEEE Transactions on Professional Communication,* 55(3), 254-261.

Susan Hocevar, "Building Collaborative Capacity for Maritime Security," **Scott Jasper**, Ed., *Conflict and Cooperation in the Global Commons: A Comprehensive Approach for National Security,* Georgetown University Press, Washington, D.C., 2012.

INFORMATION SCIENCES

Michael R. Clement and **Dennis Volpano**, "Programmable Diagnostic Network Measurement with Localization and Traffic Observation," in 5th Symposium on Configuration Analytics and Automation (SafeConfig 2012), Baltimore, MD, October 3–4, 2012.

NATIONAL SECURITY AFFAIRS

Assistant Professor Erik Dahl presented a paper entitled "Where Does Homeland Security Studies Fit In?" at the annual conference of the security studies sections of the International Studies Association and American Political Science Association, held in Chapel Hill, North Carolina, October 4–6. Dahl also organized two panels at the conference that examined the state of homeland security studies in academia today.

Maiah Jaskoski, "Private Financing of the Military: A Local Political Economy Approach," in *Studies in Comparative International Development,* forthcoming. Published online September 2, 2012: http://www.springerlink.com/openurl.asp?genre=article&id=doi:10.1007/s12116-012-9119-2.

Assistant Professor Sophal Ear was appointed to the international advisory board of the *Journal of International Relations and Development* (Palgrave Macmillan).

Sophal Ear and S. Burgos, "Cambodia: The Challenge of Adding Value to Agriculture after Conflict," chapter in *Challenging Post-Conflict Environments: Sustainable Agriculture,* Alpaslan Özerdem and Rebecca Roberts (eds.), Centre for Peace and Reconciliation Studies, Coventry University, UK (Ashgate), October 2012. ISBN: 9781409434825.

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Miller, N. L., Tvaryanas, A. P., & **Shattuck, L. G.** (2012). "Accommodating adolescent sleep-wake patterns: The effects of shifting the timing of sleep on training effectiveness." *Sleep*, 35(8), 1123–1136.

Araya, F., **Dell, R.,** Donoso, P., Marianov, V., Martinez, F., & Weintraub, A. (2012). "Optimizing location and size of rural schools in Chile." *International Transactions in Operational Research*, 19(5), 695–710.

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Badiey, M., Song, A., and **Smith, K.B.,** "Coherent reflection from surface gravity water waves during reciprocal acoustic transmissions," *J. Acoust. Soc. Am.* 132, pp. EL290–295, 2012.

Senne, J., Song, A., Badiey, M, and **Smith, K.B.,** "Parabolic equation modeling of high frequency acoustic transmission with an evolving sea surface," *J. Acoust. Soc. Am.* 132, pp. 1311–1318, 2012.

Kim, H., Potty, G., Dossot, G., **Smith, K.B.,** and Miller, J.H., "Long range propagation modeling of offshore wind turbine construction noise using Finite Element and Parabolic Equation models," *Proc. Oceans 2012*, 21-24 May, Yeosu, Korea, 2012.

In August, 2012, **Professor Kevin Smith** led researchers from NPS and GA Tech in the deployment in Monterey Bay of two AUV gliders equipped with advanced acoustic sensors. NPS has three such gliders from Alaska Native Technologies and is working with ONR to acquire more. **Tad Masek,** Center for Autonomous Vehicle Research, was lead engineer. Collected acoustic data is being analyzed by NPS and GA Tech to determine the utility of such systems for target tracking and as surrogates for DNS nodes or ad hoc ranges.

P. Gagnon, **J. A. Rice, G. A. Clark**, "Clock Synchronization through Time-Variant Underwater Acoustic Channels," *Proc. NATO Underwater Communications Conference*, Sestri Levante, Italy, September 12–14, 2012.

Kim, A. M., & **Olsen, R. C.** (2012). "Detecting trails in LiDAR point cloud data." *Laser Radar Technology and Applications* XVII, 8379, 837906.

T. Rochholz, "Wave-Powered Unmanned Surface Vehicle as a Station-Keeping Gateway Node for Undersea Distributed Networks," presented at NDIA Undersea Warfare Technology Conference, Groton, CT, September 24–27, 2012.

NATIONAL RESEARCH COUNCIL ASSOCIATESHIP PROGRAM

Read about NRC post-docs **Jason Flanagan** (advisor **Timor Radko**, Oceanography), **Michael Kopera** (advisor **Frank Giraldo**, Applied Math), and **Sakthivel Kumarasamy** (advisor **Sri Sritharan**, DRCSI) in the August edition of the NRC newsletter at http://sites.nationalacademies.org/xpedio/groups/pgasite/documents/webpage/pga_072552.pdf. General information on the NRC Research Associateship Program can be found at http://sites.nationalacademies.org/pga/rap/ or email research@nps.edu.
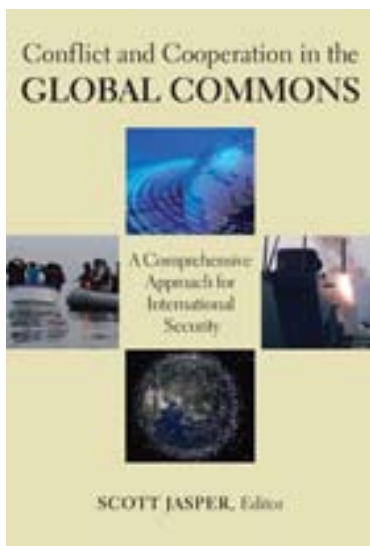
CONFLICT AND COOPERATION EXPLORED

Conflict and Cooperation in the Global Commons: A Comprehensive Approach for International Security, edited by **Lecturer Scott Jasper,** Center for Civil-Military Relations, is now available.

International security and economic prosperity depend on safe access to the shared domains that make up the global commons: maritime, air, space, and cyberspace. These domains serve as essential conduits through which international commerce, communication, and governance prosper. However, the global commons are congested, contested, and competitive. In the January 2012 defense strategic guidance, the U.S. confirmed its commitment "to lead global efforts with capable allies and partners to assure access to and use of the global commons, both by strengthening international norms of responsible behavior and by maintaining relevant and interoperable military capabilities."

Scott Jasper

In the face of persistent threats, some hybrid in nature, and their consequences, this book provides a forum where contributors identify ways to strengthen and maintain responsible use of the global commons. The result is a comprehensive approach that will enhance, align, and unify commercial industry, civil agency, and military perspectives and actions.
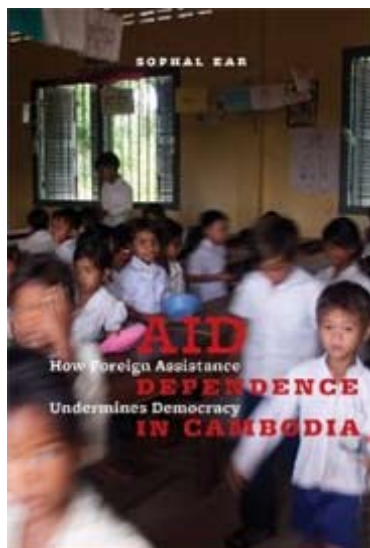
PERILS OF DEPENDENCY ANALYZED

Assistant Professor Sophal Ear has written a new book, *Aid Dependence in Cambodia: How Foreign Assistance Undermines Democracy*, Columbia University Press, 2012 (http://cup.columbia.edu/book/978-0-231-16112-1/), on the unintended disaster of foreign aid to Cambodia.

International intervention liberated Cambodia from pariahstate status in the early 1990s and laid the foundations for more peaceful, representative rule. Yet social indicators and the integrity of political institutions declined rapidly, while inequality grew dramatically. International intervention and foreign aid resulted in higher maternal (and possibly infant and child) mortality rates and unprecedented corruption by the mid-2000s. Similarly, in example

Sophal Ear

after example, Ear finds the more aid dependent a country, the more distorted its incentives to develop sustainably. By outlining the terms through which countries can achieve better ownership of their development, Ear offers alternatives for governments still on the brink of collapse, despite ongoing dependence on foreign intervention and aid.
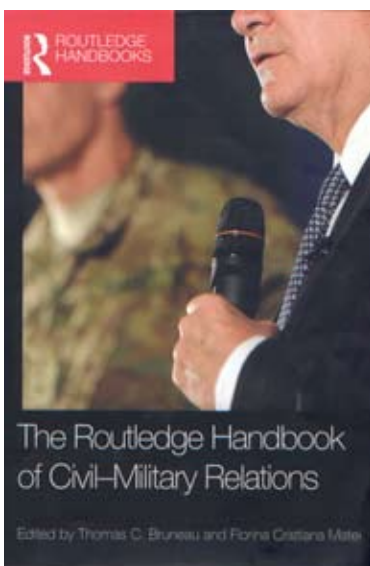
CIVIL–MILITARY RELATIONS HANDBOOK PUBLISHED

The Routledge Handbook of Civil–Military Relations, edited by **Distinguished Professor Thomas Bruneau** and Florina Cristiana Matei, was published in September by Routledge.

The handbook offers a wide-ranging, internationally focused overview of the field of civil–military relations.

The armed forces are central actors in most societies and are involved in many different roles. Among other activities, they engage in peace operations, support the police in fighting crime, support civilian authorities in dealing with natural disasters, and fight against terrorists and in internal conflicts. The existing literature on this subject is limited in its discussion of war-fighting and thus does not do justice to this variety of roles.

The Routledge Handbook of Civil–Military Relations not only fills this important lacuna, but offers an up-to-date comparative

Thomas Bruneau

analysis that identifies three essential components in civil–military relations: (1) democratic civilian control; (2) operational effectiveness; and (3) the efficiency of the security institutions. This new Handbook will be essential reading for students and practitioners in the fields of civil–military relations, defense studies, war and conflict studies, international security and IR in general. Details are available at www.routledge.com/books/details/9780415782739/
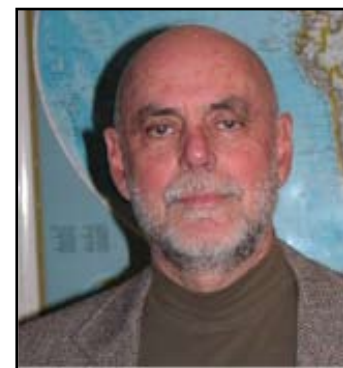
COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENT (CRADA)

Title: Advanced Research on Transport of Hydrocarbon in the Environment
Partner: University of Miami
PI: Jamie MacMahan, Department of Oceanography
Summary: The collaborators will examine the cross-shore transport of material, like oil, between the surf zone and inner shelf, particularly around the Gulf States. Collaborators will collect field observations currently missing to explain the cross-transport, such that we can verify a model and theory, which can be used for prediction, thus enabling improved risk management and response

Title: Electronic Warfare Technology Investigation
Partner: General Atomics Aeronautical Systems, Inc.
PI: David Jenn, Department of Electrical and Computer Engineering
Summary: The collaborators will examine the risks, threats, vulnerabilities and opportunities associated with both offensive and defensive electronic-warfare antenna and antenna systems.

TECHNICAL REPORTS PUBLISHED

NPS-OC-12-003CR	Movements and Spatial Use of Odontocetes in the Western Main Hawaiian Island: Results from Satellite-Tagging and Photo-Identification off Kauai and Niihau in July/August 2011	R. W. Baird, D.L. Webster, G. S. Schorr, J. M. Aschettino, *et al*
NPS-OC-12-004CR	Datasets of Odontocete Sounds Annotated for Developing Automatic Detection Methods, FY09-10	D. K. Mellinger
NPS-OR-12-003	Differential Equation Models for Sharp Threshold Dynamics	H. Schramm, N. Dimitrov

Technical reports may be obtained at http://www.nps.edu/Research/TechReports.html

NPS RESEARCH BOARD

The purpose of the research board is to support NPS faculty and researchers, advising the vice president and dean of research. An active research board can help ensure that ongoing university-wide challenges and decisions regarding research include deliberate and thorough faculty review. The full charter can be found at http://www.nps.edu/research/ResearchBoard/ResearchBoardCharter.pdf. The current composition of the research board consists of:

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