

OCEANS 2022, Hampton Roads

**Hampton Roads, Virginia, USA
17-20 October 2022**

Pages 1-726



**IEEE Catalog Number: CFP22OCE-POD
ISBN: 978-1-6654-6810-7**

**Copyright © 2022 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

| | |
|-------------------------|-------------------|
| IEEE Catalog Number: | CFP22OCE-POD |
| ISBN (Print-On-Demand): | 978-1-6654-6810-7 |
| ISBN (Online): | 978-1-6654-6809-1 |
| ISSN: | 0197-7385 |

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

TABLE OF CONTENTS

| | |
|---|-----|
| Bionic Geomagnetic Navigation Method for AUV Based on Differential Evolution Algorithm | 1 |
| <i>Yuqi Zhou, Yun Niu, Mingyong Liu</i> | |
| NOAA National Water Level Observation Network Recapitalization..... | 6 |
| <i>Robert Loesch, Richard Edwing, Chung-Chu Teng, Brent Ache, Louis Licate, Manoj Samant, Scott Mowery</i> | |
| Influence of Temperature and Salinity on All-Terminal Reliability for multi-AUV Cooperative Systems..... | 16 |
| <i>Qingwei Liang, Qixun Hu, Mingyang Luo, Yunxing Li</i> | |
| Background Structure Functions for Statistical Acoustic Propagation Characterization..... | 32 |
| <i>Michael C. Kobold, Pierre-Philippe Beaujean</i> | |
| Shallow Search of a 10-Mile Swath with a Flight of Ship-Based UAVs..... | 42 |
| <i>Andreas Von Flotow, V Tom Q. Donaldson, Shaju John</i> | |
| Numerical Investigation on the Hydrodynamic Characteristics of a Tandem Multibody AUV with Distributed Thrusters | 48 |
| <i>Shuai Kang, Jiancheng Yu, Jin Zhang, Feng Hu, Qianlong Jin, Yi Qu, Zhiqing Li</i> | |
| Detection and Classification of Subsea Objects in Forward-Looking Sonar and Electro-Optical Sensors for ROV Autonomy..... | 54 |
| <i>Vincente Nguyen, Leverett Bezanson, Ben Kinnamman</i> | |
| A Systematic Cost-Effective Approach for Underwater Photogrammetry | 62 |
| <i>Pieter Piscaer, Sebastian Henrion, Bas Binnerts, Marten Van Antwerpen, Leonor Fermoselle, Sander Van Der Hurk, Frank Ter Haar</i> | |
| Digital Twin Method for Global Motion and Stress Monitoring of a Steel Lazy Wave Riser..... | 72 |
| <i>Chungkuk Jin, Sung-Jae Kim, Moohyun Kim, Amitava Guha, Donghwan Lee, Oleg E. Esenkov, Wei Xu, Benjamin Smith, Sam Ryu</i> | |
| Exploring Latent Verification Methods for Inundation Forecasting Models Through Remote Sensing Networks and Community Science..... | 79 |
| <i>Jon Derek Loftis</i> | |
| Using UVC Lights to Eliminate Biofouling in Pumped Cooling Systems | 86 |
| <i>Scott Williams</i> | |
| Prediction of Actual Passing Distance for Path Planning of Unmanned Surface Ships | 91 |
| <i>Ülkü Öztürk</i> | |
| SERDP/ESTCP Munitions Response Program: A Summary of Progress and a Way Forward for Underwater Remediation of Unexploded Ordnance (UXO) | 98 |
| <i>Michael D. Richardson, Michael T. Tuley</i> | |
| Modeling Acoustic Channel Variability in Underwater Network Simulators from Real Field Experimental Data..... | 104 |
| <i>Nicola Toffolo, Antonio Montanari, Filippo Campagnaro, Michele Zorzi</i> | |

| | |
|---|-----|
| Preliminary Results on Distribution Shift Performance of Deep Networks for Synthetic Aperture Sonar Classification..... | 111 |
| <i>Isaac D. Gerg, Vishal Monga</i> | |
| Underwater Image Classification Via Multiview-Based Auxiliary Learning | 120 |
| <i>Ioannis Athanasiadis, Nils Bore, John Folkesson</i> | |
| Artificial Intelligence for the Undersea System Life Cycle..... | 127 |
| <i>Alexander Laun</i> | |
| Underwater Wireless Electromagnetic/Radio Communication Using Software Defined Radios..... | 135 |
| <i>Jason Farmer, Robert Moorhead, Bo Tang, Ryan Green, Jane Moorhead</i> | |
| Establishment and Analysis of Two Angular Response Correction Methods for Multi-Beam Backscattering Intensity Data..... | 142 |
| <i>Linbang He, Zhanwang Dai, Wei Guo, Junjun Yan, Bin Yang</i> | |
| Path Planning for Multiple USV Collecting Seabed-Based Data Based on UWA Communication | 156 |
| <i>Xu Sun, Ling Zhang, Dalei Song, Q. M. Jonathan Wu</i> | |
| Rapid Adaptive Climate Change Model: Application of a Probabilistic Centred Approach to the Minas Passage Bay of Fundy Datasets | 160 |
| <i>Ian Kenny, Dhouha Kbaier</i> | |
| Seafloor Sediments Classification of Side-Scan Sonar Images Based on Dual-Path Network | 165 |
| <i>Kexin Zhu, Yuxin Zhao, Yuanwen Xue, Yi Yang, Changzhe Wu, Xiong Deng</i> | |
| YOLOX-DC: A Small Target Detection Network Up to Underwater Scenes | 170 |
| <i>Wenjia Ouyang, Yanhui Wei, Danxu Wang</i> | |
| Hydrodynamic Modeling of Fast Semi-Submersible Vehicle in Deep and Shallow Water | 176 |
| <i>Konstantin I. Matveev</i> | |
| MPC for 3-D Trajectory Tracking of UUV with Constraints Using Laguerre Functions..... | 182 |
| <i>Wei Zhang, Qiang Wang, Wenhua Wu, Peiyu Han</i> | |
| Research on Multi-UUV Path Planning Method Based on Recycling Task | 188 |
| <i>Wei Zhang, Kaihang Zhang, Yu Li, Peiyu Han</i> | |
| An Improved ConvLSTM Network for Arctic Sea Ice Concentration Prediction..... | 195 |
| <i>Jianxin He, Yuxin Zhao, Dequan Yang, Kexin Zhu, Xiong Deng</i> | |
| DCSP-Yolov5: Improved Yolov5 Based on Dilated Convolution for Object Detection of Forward-Looking Sonar Images..... | 200 |
| <i>Yuanzi Li, Xiufen Ye, Weizheng Zhang, Weizhi Liu</i> | |
| A Fiber-Based Sensing Array for Persistent Ocean Monitoring | 205 |
| <i>Daniel K. Freeman, Stephen Lynch, Jonathan D. Anderson, Richard Teal, Matthew Bernasconi, Michael Rickley, Philip Bailey, Jimmy Nguyen, Bruce Thompson, Mihai Ibanescu, Graeme Knox, Alexander Stolyarov, Andrew March, Livia Racz</i> | |
| Dynamic Observations in the Hampton Roads Region: How Surface Currents at the Mouth of Chesapeake Bay May Be Linked with Winds, Water Level, River Discharge and Remote Forcing from the Gulf Stream..... | 210 |
| <i>Tal Ezer, Shelby Henderson-Griswold, Teresa Updyke</i> | |

| | |
|---|-----|
| Vortex Induced Vibration Test of the WITT Device in a Tidal Channel..... | 215 |
| <i>Ruth Branch, Robert J. Cavagnaro, Alex Turpin, James McVey, Martin Wickett, Mairi Wickett, William Boulton, Simon Hindley</i> | |
| A Network Infrastructure for Monitoring Coastal Environments and Study Climate Changes in Marine Systems | 222 |
| <i>Filippo Campagnaro, Nicola Toffolo, Alessandro Pozzebon, Roberto Francescon, Alberto Barausse, Laura Airoidi, Michele Zorzi</i> | |
| Efficient WEC Array Buoy Placement Optimization with Multi-Resonance Control of the Electrical Power Take-Off for Improved Performance | 230 |
| <i>Madelyn G. Veurink, Wayne W. Weaver, Rush D. Robinett, David G. Wilson, Ronald C. Matthews</i> | |
| The Analysis of Dynamic Coupling for Intervention-AUV Via a Hybrid Space Approach | 236 |
| <i>Yongkang Hou, Yanhui Wei, Zehao Mu</i> | |
| Trajectory Tracking of Flapping Foil Bio-Mimetic Autonomous Underwater Vehicle Using Advanced PID Controller Tuning Methods..... | 246 |
| <i>M V Aruna</i> | |
| Manifold Learning Analysis and Bayesian Latent-Observational Feature Prediction of a Large Eddy Simulated Turbulence Field..... | 253 |
| <i>Nicholas Scott, Tobias Kukulka</i> | |
| Baywatch 2.0: Rescuing Drowning Persons with an Underwater Robotic Lifeguard..... | 262 |
| <i>Eike Krieg, Daniel Weber, Helge Renkewitz, Sven Thomas</i> | |
| Control of Scattering Sound Field from a Cylindrical Shell Using Beam Deflection | 267 |
| <i>Manjie Mei, Buchao An, Yongsen Xia, Jianlong Li</i> | |
| A Univariate and Multivariate Machine Learning Approach for Prediction of Significant Wave Height..... | 271 |
| <i>Vamshikrishna Domala, Tae-Wan Kim</i> | |
| A Long-Term Cruise Monitoring System for Marine Ranching Based on Surface Docking Station | 278 |
| <i>Zhuoyu Zhang, Dejun Li, Mingwei Lin, Yucheng Zhao, Rundong Wu, Shuguang Chu</i> | |
| An Efficient Constrained Global Optimization Method Through Adaptively Adjusting Predicted Feasible Region and Its Application in Buckling Design of Stiffened Cylindrical Shell with Variable Ribs | 282 |
| <i>Yong Zeng, Yuansheng Cheng, Jun Liu, Pan Zhang</i> | |
| Real-Time Detection Method for Submarine Pipeline Leakage Based on Deep Learning and Jetson Nano | 290 |
| <i>Xinhua Zhao, Zheng Huang, Lei Ye, Yongjia Lv</i> | |
| Heave and Roll Control of Biomimetic AUV Using Advanced Control Strategies..... | 300 |
| <i>M V Aruna</i> | |
| Experimental Analysis of Oscillating Water Column Air Turbines..... | 307 |
| <i>L. Andrew Gish, James B. Selby</i> | |
| Mooring Load Monitoring of a Wave Energy Converter Using a Self-Synchronizing Underwater Acoustic Network..... | 314 |
| <i>Pierre-Philippe Beaujean, Nigel Kojimoto, Budi Gunawan, Frederick Driscoll</i> | |

| | |
|---|-----|
| Placement and Denoising of Total Magnetic Field Sensors Onboard an AUV in Support of Geophysical Navigation | 322 |
| <i>Timothy Cracchiolo, Pierre-Philippe Beaujean, Manhar Dhanak</i> | |
| Research on Underwater Image Recognition Based on Transfer Learning | 329 |
| <i>Jijia Zhou, Junbin Zhuang, Benyin Li, Liang Zhou</i> | |
| Geometric Optimization of Heaving Oscillating Water Column for Wider Resonant Bandwidth | 336 |
| <i>John W. Bowers, L. Andrew Gish</i> | |
| Real-Time Ocean Small Target Detection Based on Improved YOLOX Network..... | 344 |
| <i>Puhui Qu, En Cheng, Keyu Chen</i> | |
| Estimation of Steady-State Wind Parameters on Ship Surface Based on Improved Multi-Anemometer Weighted Fusion Method..... | 349 |
| <i>Yuying Zhang, Fanming Liu, Zhizhong Lu, Yanbo Wei</i> | |
| Site Assessment of Multi-Purpose Offshore Platform with OTEC in East and Southeast Asia..... | 354 |
| <i>Yutian Ding, Fengjun Duan, Shigeru Tabeta</i> | |
| DeepC3000 – First Deployment of a Pressure Housing Made of UHPC for Depths Up to 3,000 M on a Deep-Sea Mission Using a Carrier Frame Made of Carbon Reinforced Concrete | 360 |
| <i>Elisabeth Schütze, Alexander Schumann, Frank Wenzhöfer, Lennard Frommhold, Sebastian Wilhelm, Marcus Hering, Heinrich Wasemann</i> | |
| DeepC3000 – Large Corrosion-Free Pressure Housing Made of Ultra-High Performance Concrete (UHPC) for Depths Up to 3,000 M | 368 |
| <i>Marcus Hering, Sebastian Wilhelm, Manfred Curbach, Heinrich Wasemann, Martin Bergholz, Frank Wenzhöfer, Lennard Frommhold, Elisabeth Schütze, Alexander Schumann</i> | |
| Dynamic Objective Field for Marine Element Sampling Based on γ Discount Function | 375 |
| <i>Yuxin Zhao, Hengde Zhao, Xiong Deng</i> | |
| A Loop Selection Front-End for Underwater Visual GraphSLAM | 382 |
| <i>Antoni Burguera</i> | |
| Enveloped Sinusoid Parseval Frames..... | 388 |
| <i>Geoff Goehle, Benjamin Cowen, J. Daniel Park, Daniel C. Brown</i> | |
| Stereolithography 3D Printed Resin Pressure Enclosures Applied in the Marine Environment..... | 398 |
| <i>Parker Baillon, Suzanne Dixon, Katlynd Faust, Payton Herman, Harpoon Seabring, Stephen Wood</i> | |
| A Novel Aquatic Propulsor Inspired by Mobuliform Swimming | 405 |
| <i>Cole R. James, Roman G. Sanelli, Pascal D. Spino, Francisco M. F. R. Gonçalves, Conor K. Trygstad, Néstor O. Pérez-Arancibia, Konstantin I. Matveev</i> | |
| K-Wave as a Modelling Tool for Underwater Acoustical Imaging..... | 415 |
| <i>Mimisha M Menakath, Mahesh Raveendranatha Panicker, G Hareesh</i> | |
| Research on Wave Active Compensation Control Method Based on Control Time Delay | 421 |
| <i>Tianyu Ma, Yanhui Wei, Yueyue Wang, Helong Zhang, Yuntao Han</i> | |
| Solution of Tidal Equations and Inversion of Bottom Friction Coefficient Based on Neural Networks | 427 |
| <i>Jian Wang, Yonggang Wang, Xiumin Gao, Peng Ren</i> | |

| | |
|---|-----|
| Formation Control of Networked Autonomous Underwater Vehicles with Obstacle Avoidance | 431 |
| <i>Wei Yu, Diane D. Dimassa</i> | |
| USV Fleet Planning Considering Logistical Constraints Using Genetic Algorithm | 438 |
| <i>Brian R. Page, Joshua Darosa, Jason Lindler</i> | |
| A Novel Multi-AUV Cooperative Navigation Method Using Information Incorporation | 445 |
| <i>Feng Liu, Huifang Chen, Lei Xie</i> | |
| Morphological Component Analysis of Long-Duration Ringdown from Elastic Objects Imaged with the Sediment Volume Search Sonar..... | 451 |
| <i>Hannah R. Kurdila, Geoff Goehle, Daniel C. Brown</i> | |
| Improvement of Sargassum Seaweed Tracking in Puerto Rico and Virgin Islands Using High- Resolution FVCOM..... | 457 |
| <i>Haibo Xu, Julio Morell, Hugh Roarty, Patricia Chardon, Miguel Canals, Colin Evens</i> | |
| Using Image Processing Techniques to Maximize the Value of Autonomous MPA Monitoring for Managers | 464 |
| <i>Samantha Cope, Virgil Zetterlind, Brendan Tougher</i> | |
| Developing a Very-Shallow Underwater Test Bed for Munitions Technology Demonstration | 469 |
| <i>Raymond Lim, Amanda Bobe, Daniel D. Sternlicht, Joseph Calantoni, Edward F. Braithwaite</i> | |
| A Hybrid Adaptive Velocity Aided Navigation Filter with Application to INS/DVL Fusion..... | 475 |
| <i>Barak Or, Itzik Klein</i> | |
| Scheduling and Tasking of Autonomous Systems for Collaborative Missions | 480 |
| <i>Sam Jackson, Connie Golsteijn, Robert Johnson, Andrea Munafò</i> | |
| Multi-Sensor Towbody (MuST): An Expandable Platform for Detection, Classification, and Geolocation of Unexploded Ordnance | 485 |
| <i>Kevin Williams, Timothy Marston</i> | |
| A Mathematical Framework and Theory Governing the Verification of Autonomous Systems..... | 489 |
| <i>Benjamin T. Hartman, Richard D. Tatum</i> | |
| Machine Learning for Direction of Arrival Estimation Using an Underwater Glider Mounted Acoustic Compact Volumetric Array with Experimental Results..... | 495 |
| <i>Jan Sliwka, Bart Gips, Walter Zimmer</i> | |
| Twin Autonomous Glider Formation: Innovative Navigation and Sea Current Estimation Using Two Acoustically Connected Underwater Gliders..... | 500 |
| <i>Jan Sliwka</i> | |
| Using Motionally Induced Electric Fields to Measure Water Currents | 507 |
| <i>Hugh Fargher, Brian Leslie, Clara Hulburt, Dan Ryan</i> | |
| MIMO-OFDM Over a 10km Acoustic Link: An Experimental Study at the Suruga Bay, Japan | 511 |
| <i>Zhengan Li, Alicia Bel Ventosa, Diego A. Cuji, Yukihiro Kida, Mitsuyasu Deguchi, Takuya Shimura, Milica Stojanovic</i> | |
| A Comparison of Time Domain VS Frequency Domain Delay and Sum Beamforming for Underwater 3D Acoustical Imaging | 515 |
| <i>Mimisha M Menakath, Mahesh Raveendranatha Panicker, G Hareesh</i> | |

| | |
|---|-----|
| A Novel Underwater Hexapod Robot Can Be Used for Fixed-Point Work..... | 520 |
| <i>Wei Zhang, Qingshuo Gong, Haoyu Yang, Yejing Tang</i> | |
| Sensor Networks Visualization and Analysis of the Oceanography Research Vessel Isabu..... | 525 |
| <i>Hangoo Kang, Sang Do Heo, Gyeong-Mok Lee, Wooyoung Jeong, Saehun Baeg, Daeyeon Kim</i> | |
| CEOS Ocean Variable Enabling Research & Applications for GEO (COVERAGE): A Platform to Simplify and Expand the Accessibility and Usage of Inter-Agency Satellite and In-Situ Oceanographic Data | 530 |
| <i>Vardis M. Tsonetos, Jorge Vazquez, Thomas Huang, Toshio M. Chin, Joe T. Roberts, Joseph Jacob, Flynn Platt, Vaishnavi Yathirajam</i> | |
| Trajectory Tracking Control for Subsea Cruise and Docking of Autonomous Underwater Helicopter..... | 536 |
| <i>Qing Wang, Zheyuan Wu, Haocai Huang</i> | |
| Advancing Clarity: Analysis of UxS Legal Questions | 542 |
| <i>Marina Lesse, Philip Decocco, Kristen Fletcher</i> | |
| Physical Modeling of the Effect of Rhizophora Mangle and Avicennia Germinans on Wave Runup..... | 548 |
| <i>Samantha Chan, Tori Tomiczek, Anna Wargula</i> | |
| Cut and Capture System Technology for Demilitarization of Underwater Munitions..... | 553 |
| <i>Steve Schmit</i> | |
| Efficient Delay Wave Suppression Using Spatio-Temporal Equalization with Unequally Spaced Array for Underwater Acoustic Communications | 563 |
| <i>Hiroyuki Fukumoto, Yosuke Fujino, Miharuru Oiwa, Yuya Ito, Ryota Okumura, Seiji Ohmori</i> | |
| Development of a Methodology to Estimate Fatigue Damage in Tubular Joints of Jackets Due to Direct Wave Loads in Splash Zone..... | 569 |
| <i>Sambit Supriya Dash, S Nallayarasu</i> | |
| Distributed Networked Sensing for Ocean Current Field Based on Grid Topology..... | 579 |
| <i>Hao Chen, Huifang Chen, Lei Xie, Kuang Wang</i> | |
| A Software-Defined Optical Wireless OFDM System for Underwater Video Communication..... | 585 |
| <i>Peng Chen, Yue Rong</i> | |
| Development of MEMS IMU Based and Solar Powered Wave Buoy FZ | 590 |
| <i>Tsubasa Kodaira, Tomotaka Katsuno, Yasushi Fujiwara, Takehiko Nose, Jean Rabault, Joey Voermans, Masafumi Kimizuka, Jun Inoue, Takenobu Toyota, Takuji Waseda</i> | |
| Quadrilateral Overlapping Finite Elements for the Time-Harmonic Acoustic Propagation | 596 |
| <i>Qiang Gui, Yingbin Chai, Xiangyu You, Wei Li</i> | |
| A Mariculture Fish Mortality Prediction Using Machine Learning Based Analysis of Water Quality Monitoring..... | 601 |
| <i>Ramadhona Saville, Katsumori Hatanaka, Atsushi Fujiwara, Masaaki Wada, Reny Puspasari, Hatim Albasri, Nugroho Dwiyooga, Ahmad Muzaki</i> | |
| Modulation Recognition of Underwater Acoustic Communication Signals Based on Phase Diagram Entropy | 605 |
| <i>Denis Stanescu, Angela Digulescu, Cornel Ioana, Alexandru Serbanescu</i> | |
| Estimating the Coverage Measure and the Area Explored by a Side-Scan Sonar | 612 |
| <i>Maria Luiza Costa Vianna, Eric Goubault, Luc Jaulin, Sylvie Putot</i> | |

| | |
|--|-----|
| A Distortion-Guided Strategy for Efficient Underwater Image Restoration..... | 618 |
| <i>Zuxin Lin, Weiling Chen, Weitao Lin, Wenghao Chen, Tiesong Zhao</i> | |
| Blue Crawfish Goes Swimming: Hardware Architecture of a Crawling Skid for Underwater Maintenance with a BlueROV2..... | 623 |
| <i>Henrich Preuß, Valeska Cherewko, Johann Wollstadt, Anne Wendt, Helge Renkewitz</i> | |
| Theoretical and Experimental Multi-Sensor Signal Detection in Time Spreading Distortion Underwater Channels | 628 |
| <i>Rami Rashid, Erjian Zhang, Ali Abdi, Zoi-Heleni Michalopoulou</i> | |
| Effect of Variable LED Rise Time on High Speed OOK Underwater Visible Light Communication System | 632 |
| <i>Priya Pandey, Gunjan Matta, Monika Aggarwal</i> | |
| Evaluating Autonomous System Performance in the Surfzone | 638 |
| <i>A. Spicer Bak, Patrick Durkin, Matthew J. Saenz, Katherine L. Brodie, Brittany L. Bruder, Michael F. Forte</i> | |
| Impact of Variable Aperture Area of Receiver on High-Speed OOK Underwater Visible Light Communication System..... | 646 |
| <i>Priya Pandey, Gunjan Matta, Monika Aggarwal</i> | |
| Design and Development of a Bioinspired Lateral Line Sensor for Uncrewed Underwater Vehicle Operations | 653 |
| <i>Cameron Smith, Alexander Laun, Levi Devries, David W. Fredriksson, Mark Murray</i> | |
| Development of a Low Cost Instrument Profiler for Subsea Cabled Observatories | 663 |
| <i>Andrew Baron, Dillon Spence, Steve Mihaly, Dirk Brussow</i> | |
| Collaborative Recognition Over Distributed Underwater Acoustic Network..... | 668 |
| <i>Xuandi Sun, Haiyan Wang, Xiaohong Shen, Fei Hua</i> | |
| Challenges for Ocean Salinity Measurements – Calibration and Long-Term Drift..... | 673 |
| <i>Christoph Waldmann, Markus Bergenthal, Stefan Weinreben, Steffen Seitz</i> | |
| Working Toward the Development of a Generic Marine Vehicle Framework: ROS-MVP | 677 |
| <i>Emir Cem Gezer, Mingxi Zhou, Lin Zhao, William McConnell</i> | |
| Qualitative and Quantitative Study About Hull-Propeller Interaction for an X-Fin AUV by Different Propeller Models | 682 |
| <i>Lakshmi Miller, Stefano Brizzolara</i> | |
| Quantitative Analysis of Microplastics on Texas Beaches | 690 |
| <i>Maureen Hayden, Win Cowger</i> | |
| Energy-Optimal Path Planning of Autonomous Underwater Vehicles Using Adaptive Flow Models | 694 |
| <i>Henry Valachovic, Niankai Yang, Jing Sun</i> | |
| Towards Under-Ice Sensing Using a Portable ROV..... | 700 |
| <i>Lin Zhao, Mingxi Zhou, Brice Loose</i> | |
| Asymmetric Entanglement of a Propeller with Marine Vegetation | 708 |
| <i>James M. Dubyoski, Joseph T. Klamo, Anthony G. Pollman</i> | |

| | |
|--|-----|
| Ocean Experiment Result of Two Reference Points Underwater Positioning System for Three AUVs Team Operation | 718 |
| <i>Yukiko Muller, Shiho Oshiro, Shigeo Nakagawa, Akiyoshi Kawamori, Taisaku Suzuki, Hajime Toma, Tomohisa Wada</i> | |
| Characterization of the Steady-State Operating Conditions of Tethered Coaxial Turbines..... | 727 |
| <i>Vinson Oliver Williams, Samuel Bryant, Saurabh Agrawal, Andre P. Mazzoleni, Kenneth Granlund, Praveen Ramaprabhu, Matthew Bryant</i> | |
| Estimation of Multi-Objective Optimal Solutions for Hypothetical Systems: A Probabilistic Step Towards the Verification of Autonomous Systems..... | 737 |
| <i>Richard Tatum, Thomas A. Wettergren</i> | |
| Planning Searches Using an Orienteering-Based Vehicle Routing Approach | 742 |
| <i>Richard Tatum, Thomas A. Wettergren</i> | |
| Application of Variational Bayesian-Based Noise Remodeling in AUV Navigation | 746 |
| <i>Pengcheng Mu, Xin Zhang, Junchao Xu, Feiyang Lu, Liqian Zhou, Bo He</i> | |
| AOA Based CKF Adaptive Algorithm for AUV Navigation..... | 751 |
| <i>Ning Zhai, Xin Zhang, Xiaokai Mu, Di Zhang, Liqian Zhou, Feiyang Lu, Bo He</i> | |
| Research on World Green Tide Phenomenon and the Green Tide Management at Qingdao Yellow Sea | 756 |
| <i>Chen Ma, Huiying Chen</i> | |
| Research on AUV Terminal Electromagnetic Positioning System Based on Two Coils | 760 |
| <i>Yucheng Zhao, Feng Zhang, Dejun Li, Bo Jin, Ri Lin, Zhuoyu Zhang</i> | |
| Research on UFastSLAM Algorithm Based on Gravity Search Algorithm..... | 765 |
| <i>Di Zhang, Xin Zhang, Ning Zhai, Ziqing Chen, Bo He</i> | |
| Adaptive Backstepping Sliding Mode Attitude Control for AUVs Subject to Model Errors and Unknown Disturbances | 770 |
| <i>W. C. Yang, P. Z. Du, R. Y. Hu, Y. Q. Wang, D. W. Xu, S. H. Huang</i> | |
| FOA-Based QR-Factorized CKF Algorithm for AUV Navigation..... | 775 |
| <i>Junchao Xu, Xin Zhang, Pengcheng Mu, Runhua Huang, Bo He, Yue Shen</i> | |
| Station-Keeping with Underwater Gliders Based on Virtual Hinges of Multi-Body System..... | 780 |
| <i>Shuai Li, Shaoqiong Yang, Ji Liu, Yanhui Wang, Wendong Niu</i> | |
| A Vibration Isolator for Improving Turbulence Observation Performances of Underwater Glider..... | 787 |
| <i>Ji Liu, Xinwen Guan, Yanhui Wang, Shuai Li, Shaoqiong Yang</i> | |
| Path Tracking of AUV Based on Improved Line-Of-Sight Method | 792 |
| <i>Guoli Shen, Zhongjing Zhou, Cuicui Xia, Xiaoting Xu, Bo He, Yue Shen</i> | |
| Underwater Image Restoration Based on Local Depth Information Prior..... | 797 |
| <i>Jun Hou, Xiufen Ye, Wenzhi Liu, Huiming Xing, Xinkui Mei, Junting Wang</i> | |
| Development of Combined Aerial and Underwater Drone System..... | 803 |
| <i>Akihiko Nishitani, Ryoichi Kawada, Junichi Kojima</i> | |
| A Task Assignment Strategy for Multi-AUV Collaborative Hunting Problem..... | 808 |
| <i>Zhongjing Zhou, Guoli Shen, Wenli Niu, Bo He, Yue Shen</i> | |

| | |
|--|-----|
| A Low-Cost, Low-Power and Low-Size Multi-Parameter Station for Real-Time and Online Monitoring of the Coastal Area | 814 |
| <i>T. Matos, J. L. Rocha, H. Dinis, C. L. Faria, M. S. Martins, Renato Henriques, L. M. Goncalves</i> | |
| An Ocean Current Prediction Method for Profiling Float Based on RBFNN | 821 |
| <i>Puzhe Zhou, Kuikui Jiao, Zhaohong Wang, Xi Cheng, Xiangdong Zhang</i> | |
| Integrated Guidance and Control Using Prescribed Performance Fractional-Order Sliding Mode for Rendezvous of AUV and USV | 825 |
| <i>Shaowei Rong, Huigang Wang, Huaxia Zhang</i> | |
| Analysis of Motion Effects of Mobile Platform in Underwater Near-Field Positioning | 833 |
| <i>Huaxia Zhang, Huigang Wang, Yuanyuan Xie</i> | |
| Simulation of the Effect of Pipe Shape on Flow Rate in Air-Lifting Artificial Upwelling Based on CFD | 837 |
| <i>Zhanglin Wang, Qingbin Wen, Sijie Hu, Haocai Huang</i> | |
| A Node State Transition Scheme with Edge Caching Assistance Based on Network Coding in UWAN | 842 |
| <i>Annan Zhang, Zhiqiang He, Kai Niu, Shengquan Li</i> | |
| Comprehensive Performance Optimization of Autonomous Underwater Helicopter Based on PSO | 847 |
| <i>Qingbin Wen, Sijie Hu, Yixin Gao, Haocai Huang</i> | |
| Development and Test of a Subsea Docking System Applied to an Autonomous Underwater Helicopter | 852 |
| <i>Chengye Cai, Zhenwei Rong, Xinyi Xie, Bo Xu, Zhuoyu Zhang, Zheyuan Wu, Yulin Si, Haocai Huang</i> | |
| The Adaptive Robust Hover Control of Autonomous Underwater Helicopter in Underwater Pipeline | 859 |
| <i>Sijie Hu, Qingbin Wen, Yixin Gao, Haocai Huang</i> | |
| An End-To-End DOA Estimation Method Based on Deep Learning for Underwater Acoustic Array | 864 |
| <i>Junyu Peng, Weihang Nie, Ta Li, Ji Xu</i> | |
| Outlier Robust Kalman Filter Based Channel Tracking for Single-Carrier Underwater Acoustic Communications | 870 |
| <i>Yanjun Wu, Yuxing Wang, Jun Tao, Le Yang, Yongjie Qiao</i> | |
| Development of a Large-Aperture 160-Element Coherent Hydrophone Array System for Instantaneous Wide Area Ocean Acoustic Sensing | 875 |
| <i>Matthew E. Schinault, Sai Geetha Seri, Max K. Radermacher, Hamed Mohebbi-Kalkhoran, Chenyang Zhu, Nicholas C. Makris, Purnima Ratilal</i> | |
| An UWA OFDM Communication System with Improved Doppler Compensation and Initial Synchronization | 884 |
| <i>Shiho Oshiro, Yukiko Muller, Hiromasa Yamada, Tomohisa Wada</i> | |
| Analysis of Displacement Sampling Performance of Deep-Sea Water Sampler Based on the Ratio of Height to Diameter of Sampling Chamber | 890 |
| <i>Yuanli Fang, Yixin Gao, Mingru Dong, Haocai Huang, Daohua Chen, Yinan Deng</i> | |
| Energy-Saving and Fault-Tolerant Topology for Underwater Acoustic Sensor Networks | 895 |
| <i>Mingru Dong, Haibin Li, Rongrong Yin, Yuhua Qin, Yongtao Hu</i> | |

| | |
|---|-----|
| Frankenstein Goes Swimming: Software Architecture of a Modified BlueROV2 Heavy for Underwater Inspection and Maintenance | 900 |
| <i>Anne Wendt, Henrich Preuss, Wito Kleinhempel, Helge Renkewitz</i> | |
| Numerical Investigation of Low-Frequency Shipping Noise in the South China Sea..... | 905 |
| <i>Jinci Wang, Bo Lei</i> | |
| Direction of Arrival Estimation Based on Graph Signal Processing for a Coprime Array | 909 |
| <i>Min Li, Xiang Pan</i> | |
| Measurement of Water Temperature and Current in a Reservoir Using Coastal Acoustic Tomography..... | 913 |
| <i>Pan Xu, Shijie Xu, Guangming Li, Yixin Gao, Xinyi Xie, Haocai Huang</i> | |
| Mapping Water Temperature in a Reservoir with Three-Dimensional Grid Inversion..... | 921 |
| <i>Shijie Xu, Guangming Li, Haocai Huang</i> | |
| Distortion Localization and Restoration Method in Water Column Area of Side-Scan Sonar Image | 928 |
| <i>Yuhang Cui, Xiufen Ye, Hanjie Huang, Wenzhi Liu, Huiming Xing, Jun Hou</i> | |
| CYGNSS Sea Surface Heat Flux Product Validation and Its Applicability..... | 933 |
| <i>Jinsong Lin, Yanfeng Wang, Tengfei Xu</i> | |
| Foldable Torpedo Anchor: A Novel Anchoring System for Deepwater Floaters | 939 |
| <i>S Keerthi Raaj, Nilanjan Saha, R Sundaravadivelu</i> | |
| A Hybrid Image Enhancement Framework for Underwater 3D Reconstruction..... | 943 |
| <i>Tengyue Li, Chen Ma</i> | |
| Portable Catamaran Drone – an Uncrewed Sampling Vehicle for Micro-Plastics and Aquaculture Research | 948 |
| <i>Artur Zolich, Andrea Faltynkova, Geir Johnsen, Tor Arne Johansen</i> | |
| Utility-Oriented Quality Assessment of Sonar Image Super-Resolution..... | 954 |
| <i>Sumei Zheng, Weiling Chen, Tiesong Zhao, Hongan Wei, Liquan Lin</i> | |
| The Effect of Harmful Algal Blooms on COVID-19 Patient Outcomes in Florida..... | 959 |
| <i>Evyatar Kanik, Hugh Roarty</i> | |
| Distributed Cooperative Velocity-Attitude Consensus Protocol for Rendezvous of the Underactuated AUV Swarm in 3-Dimensional Space | 966 |
| <i>Yu Zhang, Tian Xia</i> | |
| Sea-Whale Series AUV-Extending the Range to 4000 Kilometers | 973 |
| <i>Jianan Qiao, Jiancheng Yu, Yan Huang, Jian Cui, Bing Wang, Zhenyu Wang</i> | |
| Analysis of the Motion Characteristics of a Rope-Driven Multi-Jointed Bionic Flutter Wing | 978 |
| <i>Zhenyu Wang, Qi Yang, Hualong Xie, Yan Huang, Jianan Qiao, Enhao Li</i> | |
| 3D Acoustic Image Reconstruction of Underwater Separated Objects Using Ramp Response Signatures | 985 |
| <i>Yuzheng Yang, Yang Zhang, Wei Li</i> | |
| Research on Hydrodynamic Performance of Underwater Flexible Follow-Up Flaps Based on Two-Way Fluid-Structure Coupling..... | 990 |
| <i>Zhenyu Wang, Enhao Li, Hualong Xie, Yan Huang, Jianan Qiao, Qi Yang</i> | |

| | |
|---|------|
| Research and Design for the Power Hierarchy of a 160-Element Linear Towable Ocean Acoustic Coherent Hydrophone Array | 996 |
| <i>Max K. Radermacher, Matthew E. Schinault, Sai Geetha Seri, Purnima Ratilal</i> | |
| Flow Field Reconstruction in a Small-Scale Reservoir by Coastal Acoustic Tomography | 1003 |
| <i>Yixin Gao, Xinyi Xie, Haocai Huang</i> | |
| Comparison Between Deterministic and Deep Neural Network Based Real-Time Trajectory Prediction of an Autonomous Surface Vehicle | 1008 |
| <i>Sanjib Sarkar, Raju Kundu, Olagoke Daramola, Ben Stringer, Bikramjit Banerjee, Gero Nootz</i> | |
| The Hydrobatic Dual-Arm Intervention AUV Cuttlefish | 1012 |
| <i>Leif Christensen, Jens Hilljegerdes, Michael Zipper, Andrej Kolesnikov, Benjamin Hülsen, Christian Ernst Siegfried Koch, Marc Hildebrandt, Leon C. Danter</i> | |
| Underwater Target Detection Algorithm Based on YOLO and Swin Transformer for Sonar Images | 1020 |
| <i>Ruoyu Chen, Shuyue Zhan, Ying Chen</i> | |
| Operating Drones at Sea - Maritime Law Implications | 1027 |
| <i>Fausto Ferreira, Nikola Miškovic</i> | |
| Fourier and Wavelet Analysis of Sperm Whale Acoustic Data in the Northern Gulf of Mexico..... | 1033 |
| <i>Kendal M. Leftwich, Juliette W. Ioup</i> | |
| Design and Implementation of Differential Chirp Spread Spectrum System for Underwater Acoustic Communication | 1039 |
| <i>Marwane Rezzouki, Guillaume Ferré</i> | |
| Solar Powered Uncrewed Surface Vehicles (USVs) for Marine Protected Area (MPA) Monitoring | 1046 |
| <i>Julie Angus, Madeleine Bouvier-Brown, Ari Robinson</i> | |
| Challenges in Developing Nighttime Airborne Marine Mammal Avoidance Capability | 1051 |
| <i>Justin Goff, Alexander Elbrecht, Oleg Yakimenko</i> | |
| Increased Energy Conversion with a Horizontal Axis Turbine in Translation..... | 1057 |
| <i>Rodney Metoyer, Matthew Bryant, Kenneth Granlundt, Andre Mazzoleni</i> | |
| Acrobatic Low-Cost Portable Hybrid AUV (ALPHA): System Design and Preliminary Results..... | 1067 |
| <i>Mingxi Zhou, Emir Cem Gezer, William McConnell, Chengzhi Yuan</i> | |
| Wave Environment Characterization for Scaled Ocean Test Sites | 1072 |
| <i>Lauren Dickson, Richard Kimball, Lauren Ross</i> | |
| Toward Improving Unmanned Underwater Vehicle Sensing Operations Through Characterization of the Impacts and Limitations of in Situ Environmental Conditions | 1080 |
| <i>Benjamin M. Whitmore, Jeffrey S. Ellen, Michael C. Grier</i> | |
| Underwater Acoustic OFDM Receiver Using a Regression-Based Deep Neural Network..... | 1084 |
| <i>Sabna Hassan, Peng Chen, Yue Rong, Kit Yan Chan</i> | |
| Formation Control for Underactuated Surface Vehicles in the Presence of Ocean Current | 1090 |
| <i>Jin Li, Mingyu Fu, Lulu Wang</i> | |
| Implementation Guidelines for Terrain Aided Navigation on Underwater Vehicles | 1097 |
| <i>Yusen Gong, Ye Li</i> | |

| | |
|--|------|
| Finite-Time ESO and Non-Singular TSM Control Strategy for Trajectory Tracking of Hovercraft | 1105 |
| <i>Xueying Wang, Yuanhui Wang, Wansheng Mi</i> | |
| Evaluation of Vessel Yaw Uncertainties on Multiple Hypothesis Tracker Performance | 1114 |
| <i>Jason S. Harris, Dimitrie C. Popescu</i> | |
| Doubly Adaptive Covariance Matrix Taper Universal Beamformer | 1120 |
| <i>Savas Erdim, John R. Buck, Christopher Gravelle, C. J. Berg, Isaiah Lacombe</i> | |
| Development and Evaluation of Automated Gene Collector – ATGC-12S for Environmental DNA Sample Archive at Aquatic Environments..... | 1126 |
| <i>Tatsuhiko Fukuba, Shuji Goto, Marty Kwok-Shing Wong, Yuki Minegishi, Susumu Hyodo, Yoko Makabe-Kobayashi, Yota Sugai, Koji Hamasaki</i> | |
| Object Recognition Based Self-Position Estimation for Underwater Robots..... | 1131 |
| <i>Yuma Tamura, Takafumi Katayama, Tian Song, Takashi Shimamoto</i> | |
| YOLOX Based Underwater Object Detection for Inshore Aquaculture..... | 1136 |
| <i>Atsuki Imada, Takafumi Katayama, Tian Song, Takashi Shimamoto</i> | |
| Depth Estimation with Sonar-Based Correction for Low-Cost Underwater Drone..... | 1141 |
| <i>Kota Mantani, Takafumi Katayama, Tian Song, Takashi Shimamoto</i> | |
| Enhanced MSER Adaptive Equalization for Single-Carrier MIMO Underwater Acoustic Communications..... | 1145 |
| <i>Yuan Zhuang, Jun Tao, Zhen Qin, Ming Jiang</i> | |
| Quantitative Analysis of Deep-Sea Underwater Acoustic Multipath Channel Quality | 1150 |
| <i>Xianpeng Li, Haibin Wang, Jun Wang, Yupeng Tai, Chao Li, Fan Yang</i> | |
| Applications for Autonomous Control of Multiple AUVs Toward Deep-Sea Resource Explorations | 1156 |
| <i>Masahiko Sasano, Akihiro Okamoto, Shogo Inaba, Toshifumi Fujiwara, Hiroyuki Yamamoto, Eiichi Asakawa, Sotaro Takashima</i> | |
| A Deep Learning Framework for Semantic Segmentation of Underwater Environments..... | 1161 |
| <i>Amos Smith, Jeremy Coffelt, Kai Lingemann</i> | |
| LiBeamsNet: AUV Velocity Vector Estimation in Situations of Limited DVL Beam Measurements..... | 1168 |
| <i>Nadav Cohen, Itzik Klein</i> | |
| Reinforcement Learning-Based Underwater Acoustic Channel Tracking with Forgetting Factors..... | 1173 |
| <i>Yuhang Wang, Wei Li, Zhonghan Hao</i> | |
| Conditioned Deep Feature Consistent Variational Autoencoder for Simulating Realistic Sonar Images | 1178 |
| <i>Jeygopi Panisilvam, Miguel Castellón, Nicholas Lawrance, Roland Siegwart</i> | |
| Laser Beam Radius Modulation for Linear Optoacoustic Communication..... | 1183 |
| <i>Caibao Zhang, Shumin Chen, Peng Wang, Yuanxin Xu</i> | |
| OTFS for Underwater Acoustic Communications: Practical System Design and Channel Estimation..... | 1190 |
| <i>Su Hang, Wei Li</i> | |
| Analytical Wake Model for Coaxial Dual-Rotor Turbines | 1197 |
| <i>Mehedi Hassan, Matthew Bryant, Andre Mazzoleni, Praveen Ramaprabhu, Kenneth Granlund</i> | |

| | |
|--|------|
| Loosely-Coupled Human-Robot Teams for Enhanced Undersea Operations..... | 1204 |
| <i>Brendan W. O'Neill, Jesse R. Pelletier, S. Calvert, Alan Papalia, John J. Leonard, Lee Freitag, Eric Gallimore</i> | |
| Semantic Underwater World Modeling by Using Probabilistic Particle Filter Anchoring | 1212 |
| <i>Alberto Topini, Alessandro Bucci, Edoardo Topini, Leonardo Zacchini, Alessandro Ridolfi</i> | |
| 4D-Var Data Assimilation of Sea Surface Temperature in a Regional Model of the Andaman Sea..... | 1220 |
| <i>Abhishek Pasula, Deepak N. Subramani</i> | |
| Fusion of Multi-Modal Underwater Ship Inspection Data with Knowledge Graphs | 1226 |
| <i>Joseph Hirsch, Brian Elvesæter, Alexandre Cardaillac, Bernhard Bauer, Maryna Waszak</i> | |
| Acoustic Positioning System of Combined Aerial and Underwater Drones..... | 1235 |
| <i>Ryoichi Kawada, Akihiko Nishitani, Junichi Kojima</i> | |
| Inversion for Acoustic Properties of Mud from Reflection Measurement..... | 1240 |
| <i>Nicholas P. Chotiros</i> | |
| Inverse Kinematics of a Subsea Constrained Manipulator Based on FABRIK-R | 1248 |
| <i>Phillipe Santos, Matheus Santos, Satja Sivcev, Edin Omerdic, Gerard Dooly, Daniel Toal</i> | |
| YDE-Fix: Design, Simulation and Testing of a 1:3 Scaled Model of a remotely Towed operated vehicle for Coastal Area Research of Marine Traffic Emissions | 1255 |
| <i>Michaela Gerriets, Thomas H. Badewien, Rasmus Hohmann, Nick Rüssmeier, Laurin Rösemeier, Jann Strybny, Julius Zielke, Gregor Schellenberger, Kai Hillers</i> | |
| Necessity of Hydrostatic Stability in Autonomous Underwater Vehicles on Intervention Missions | 1265 |
| <i>Tobias Rossol, Christian Ernst Siegfried Koch, Ralf Bachmayer, Frank Kirchner</i> | |
| In Situ Glider and Remote-Sensing Satellite Data Synergy for the Estimation of the PAR Diffuse Attenuation Coefficient | 1275 |
| <i>Emma De Nodrest, Sabrina Homrani, Frédéric Jourdin, Priscille Viellefon, Jean-Marie Vient, Xavier Durrieu De Madron, Orens Pasqueron De Fommervault, François Bourrin</i> | |
| A Strip Theory and CFD Informed Lumped Parameter Model for Near-Surface Underwater Vehicle Maneuvering..... | 1284 |
| <i>William Lambert, Lakshmi Miller, Stefano Brizzolara, Craig Woolsey</i> | |
| TEAM: A Framework for Full Mission Autonomy Using Collaborative, Heterogenous Autonomous Vehicles | 1291 |
| <i>M. W. G. Van Riet, J. Van De Sande, V. Newsum, R. Van Vossen</i> | |
| Development and Control of an Autonomous Reconfigurable Underwater Vehicle | 1299 |
| <i>Edoardo Topini, Gherardo Liverani, Jonathan Gelli, Cosimo Fredducci, Alberto Topini, Alessandro Ridolfi, Benedetto Allotta</i> | |
| A Hybrid Artificial Intelligence System for Securing a Maritime Zone Based on Historical and Real-Time Data Analysis..... | 1305 |
| <i>Houssein Alaeddine, Cyril Ray</i> | |
| Feedfirst: Intelligent Monitoring System for Indoor Aquaculture Tanks..... | 1313 |
| <i>Bernardo Teixeira, Ana Paula Lima, Carlos Pinho, Diana Viegas, Nuno Dias, Hugo Silva, José Almeida</i> | |
| Event-Triggered-Based Fault-Tolerant Consensus for AUVs on Heterogeneous Switch Topology..... | 1320 |
| <i>Weida Tian, Chao Zhang, Xiaogong Lin, Yu Zhang, Wei Zhang, Kaihang Zhang</i> | |

| | |
|---|------|
| Assimilation of Heterogeneous Measurements at Different Spatial Scales in the Arctic Ocean and Norwegian Sea | 1326 |
| <i>Daniel Ørnes Halvorsen, Alberto Dallolio, Morten Omholt Alver</i> | |
| Real-Time Wall Identification for Underwater Mapping Using Imaging Sonar..... | 1336 |
| <i>António J. Oliveira, Bruno M. Ferreira, Nuno A. Cruz</i> | |
| Is All-Plastic Hardware a Solution for Cathodic Delamination on Outboard Cables? | 1343 |
| <i>Thomas S. Ramotowski</i> | |
| Robotic Ship Hull Inspection for Damage Repair | 1352 |
| <i>Luke Fitzgerald, Anthony Weir, Dinesh Babu Duraibabu, Edin Omerdic, Gerard Dooly, Daniel Toal</i> | |
| Discussion on Some Key Measurement Issues in Calibration of an Inertial Vector Receiver..... | 1357 |
| <i>Yi Chen, Guanghui Jia, Boyue Wu, Zeng Cao</i> | |
| Enabling Under-Ice Geochemical Observations with a Size, Weight, and Power-Constrained Robot..... | 1364 |
| <i>Jess Horowitz, Victoria Preston, Anna P. M. Michel</i> | |
| Architecture Design and Experimental Validation of a Modular Fully-Actuated Unmanned Surface Vehicle for Hydrological Surveys..... | 1370 |
| <i>Pin-Dong Guo, Yu-Qing Duan, Wen-Yao Chen, Jian Wang, Jun Wang</i> | |
| Sonar-To-RGB Image Translation for Diver Monitoring in Poor Visibility Environments..... | 1374 |
| <i>Bilal Wehbe, Nimish Shah, Miguel Bande, Christian Backe</i> | |
| Research on Load Sensitive Power Conversion Technology of Constant Current Seafloor Observation Network Nodes | 1383 |
| <i>Zhiyong Duan, Canjun Yang, Yanhu Chen, Anzhe Yi</i> | |
| 25 Gbit/s Underwater Optical Communication Through Turbidity Using Constant-Envelope Modulation of Coherently Coupled OAM Beams..... | 1389 |
| <i>E. Robertson, J. Free, K. Dai, J. Wiley, J. K. Miller, E. Johnson</i> | |
| Experimental Results of a k-Nearest Neighbor Power Level Controller for Flooding-Based Underwater Networks..... | 1393 |
| <i>Elias Strandell Erstorp</i> | |
| Multi-Step Ahead Wave Forecasting and Extreme Event Prediction from Buoy Data Using an Ensemble of LSTM and Genetic Algorithm-Aided Classification Model..... | 1399 |
| <i>Soumyashree Kar, Jason McKenna, Vishwamithra Sunkara, Steve Stanic, Landry Bernard</i> | |
| Measuring the Acoustic Backscattering Form Function from a Spherical Target Under Laboratory Conditions | 1406 |
| <i>Lian Sheng Wang, Kenneth G. Foote, Stephen P. Robinson, Victor F. Humphrey</i> | |
| Expanding Polar Region Monitoring Capabilities: Development of a Continuous, Multi-Year, Real-Time, Unattended, Under-Ice Measurement System | 1412 |
| <i>Candace Smith, Stefan Stimson</i> | |
| Development and Test of Subsurface ADCP Mooring for Near Surface Current Profiles in 200-300m Waters | 1417 |
| <i>Laura A. Fiorentino, Robert Heitsenrether, Lorraine Heilman, Michael Muglia</i> | |
| Pairing Digital Twins with Maritime Autonomy | 1425 |
| <i>Michael Zuba</i> | |

| | |
|--|------|
| Angle Classification of 3D-Printed Container Models Dropped into the Towing Tank | 1431 |
| <i>Austin B Schmidt, Yi Li, Atriya Sen, Xiaochuan Vincent Yu</i> | |
| Residual Data Vector Processing for Detection and Localization of Underwater Acoustic Sources by a Three-Dimensional Array | 1438 |
| <i>G. V. Anand, Sanjeev Gurugopinath, P. V. Nagesha</i> | |
| SimuShips - A High Resolution Simulation Dataset for Ship Detection with Precise Annotations | 1444 |
| <i>Minahil Raza, Hanna Prokopova, Samir Huseynzade, Sepinoud Azimi, Sebastien Lafond</i> | |
| A Hybrid Robotic Network for Maritime Situational Awareness: Results from the INFORE22 Sea Trial | 1449 |
| <i>Gabriele Ferri, Raffaele Grasso, Alessandro Faggiani, Francesca De Rosa, Elena Camossi, Alberto Grati, Pietro Stinco, Alessandra Tesei, Robert Been, Kevin D. Lepage, Konstantina Bereta, Marios Vodas, Dimitris Zissis</i> | |
| Adaptive Beamformer Sample Support for LFM High Duty Cycle Sonar Using Dechirp | 1459 |
| <i>Travis Cuprak, Nick Van Lieshout</i> | |
| Combining Remote and In-Situ Sensing for Autonomous Underwater Vehicle Localization and Navigation | 1465 |
| <i>Cesar A. Rojas, Paulo V. Padrao, Jose E. Fuentes, Arif R. Albayrak, Batuhan Osmanoglu, Leonardo Bobadilla</i> | |
| AxV Hybrid Powerplant | 1472 |
| <i>Stephen Delory</i> | |
| Biofouling Estimation in Mariculture..... | 1476 |
| <i>Matej Fabijanic, Nadir Kapetanovic, Nikola Miškovic</i> | |
| Aquabot: An Open-Ocean Aquaculture Feeding Vessel Proof-Of-Concept | 1483 |
| <i>Fiona Gillespie, Cassidy Peterson, Alisa Hathaway, Ian Hinkley, Sarah Lam, Stephanie Hoo, Yuanhao Zhou, Andrew Bennett, Michael S. Triantafyllou</i> | |
| A Solution to the Wave Equation to Model a Photo-Acoustic Imaging System Underwater | 1492 |
| <i>Ehsan Malekshahi, Jean-Francois Bousquet, Mae Seto, Christophe Bescond</i> | |
| Experimental Demonstration of Depth-Dependent Acoustic Detection Performance by Underwater Gliders | 1498 |
| <i>Zeyu Fang, Haisheng Wang, Ye Wang, Jianlong Li, Wen Xu</i> | |
| Development of Educational Marine Soft Robotics STEM Platform as New Iteration of SeaPerch K-12 National Outreach Program..... | 1502 |
| <i>Ansel Garcia-Langley, Isabel Alvarez, Audrey Chen, Alex Li, Haoyu Wang, Diane Brancazio, Valeria Gutierrez, Andrew Bennett, Michael Triantafyllou</i> | |
| A Geospatial Hub to Support Wind Energy and Maritime Activity Spaces Near Hampton Roads, Virginia, U.S.A. | 1510 |
| <i>Thomas R. Allen, Daniel P. Richards, Jennifer Whytlaw, George McLeod, Jeremiah Cronin, Jonathan J. Miles, Jesse Reiblich, Christopher Davis, Keith Vangraafeiland</i> | |
| Feasibility Study on LED-Based Underwater Gated-Viewing for Inspection Tasks | 1515 |
| <i>Jendrik Schmidt, Enno Peters, Maurice Stephan, Oliver Zielinski</i> | |
| Investigating the Overlap Between the Mid-Atlantic Bight Cold Pool and Offshore Wind Lease Areas..... | 1523 |
| <i>Rebecca Horwitz, Travis N. Miles, Daphne Munroe, Josh Kohut</i> | |

| | |
|--|------|
| Assessment of Tsunami Coastal Hazard Along the Northwest Vancouver Island from Coseismic Sources in Cascadia and Alaska Subduction Zones..... | 1529 |
| <i>Soroush Kouhi, Reza Amouzgar, Mark Rankin, Cassandra Bosma</i> | |
| Whisker Sensor Calibration and Replication..... | 1539 |
| <i>Adrienne Lai, Erin Menezes, Andrew Bennett, Michael Triantafyllou</i> | |
| Integration of Hydrodynamics and Acoustic Telemetry for Predictive Species Distribution Modelling in a Dynamic Marine Environment: Implications for Marine Renewable Energy Development | 1546 |
| <i>N/A</i> | |
| Coral Reef Image Collections for Machine Learning, Mapping, and Monitoring..... | 1556 |
| <i>Jonathan P. Leidig</i> | |
| Feasibility of a Near-Surface Wave-Powered Profiling Float for Extended Fully Submerged Autonomous Deployments | 1560 |
| <i>Russell Shomberg, Michael Jakuba, Dana Yoerger</i> | |
| Aligning the Seasonal Migration of North Atlantic Right Whales with Oceanic Features..... | 1570 |
| <i>Courtney Dreyfust, Josh Kohut, Laura Nazzaro, Joseph Brodie, Matthew Oliver, Mark Baumgartner</i> | |
| Can We Run a Tight Ship? – Using AIS Data to Help with Ocean Monitoring and Coastal Management | 1579 |
| <i>Lucianne M. Marshall, Adrienne Shumlich, Mark Rankin, Kiyomi Holman</i> | |
| On the Interest of Hexagonal Abstraction of Maritime Information | 1585 |
| <i>Maryam Maslek Elayam, Gwladys Kerhoas, Vincent Lambert De Cursay, Cyril Ray, Arnaud Ménard</i> | |
| Blended, Cross-Domain Algorithms for Improved Hydrographic DEMs | 1591 |
| <i>Bradley Battista, Brent Von Twistern</i> | |
| Simulation of Underwater Environments to Investigate Multi-Robot Systems for Marine Hull Inspection | 1595 |
| <i>Marina Ruediger, Tyler M. Paine, Ashis G. Banerjee</i> | |
| Continental Shelf-Scale Passive Ocean Acoustic Waveguide Remote Sensing of Marine Ecosystems, Dynamics and Directional Soundscapes: Sensing Whales, Fish, Ships and Other Sound Producers in Near Real-Time | 1602 |
| <i>Purnima Ratilal, Sai Geetha Seri, Hamed Mohebbi-Kalkhoran, Chenyang Zhu, Matthew Schinault, Max Radermacher, Nicholas C. Makris</i> | |
| Nonlinear System Identification for Heading and Pitch Control of a Tethered Uncrewed Underwater Vehicle in Changing and Uncertain Environments | 1609 |
| <i>Oguzhan Oruc, Alexander Cook, May-Win Thein, Bingxian Mu</i> | |
| Network Nodes for Ocean Data Exchange Through Submarine Fiber Optic Cable Repeaters | 1619 |
| <i>M. S. Martins, Nuno A. Cruz, A. Silva, Bruno Ferreira, Fred Zabel, Tiago Matos, S. M. Jesus, André Pinto, Eduardo Pereira, Anibal Matos, Carlos Faria, Marcos Tieppo, L. M. Goncalves, João Rocha, João Faria</i> | |
| Overview of the VHF Data Exchange System | 1625 |
| <i>Ronald Raulefs</i> | |

| | |
|--|------|
| Interferometric Enabled Particle Filter for Underwater Navigation | 1629 |
| <i>Joellen Wilbur, Peter Romaine, Nathan Fuller, Daniel Sternlicht</i> | |
| On the Utility of Multiple Sonar Imaging Bands for Underwater Object Recognition | 1635 |
| <i>David P. Williams</i> | |
| A Small-Scale Tether Management System for Under-Ice Ocean Profiling..... | 1641 |
| <i>Frances Bryson, Justin Burnett, Matt Meister, Walter King, Britney Schmidt</i> | |
| Ecological Coastal Units – Standardized Global Shoreline Characteristics | 1650 |
| <i>Roger Sayre, Kevin Butler, Keith Van Graafeiland, Sean Breyer, Dawn Wright</i> | |
| Towards Energy-Optimized On-Board Computer Vision for Autonomous Underwater Vehicles..... | 1654 |
| <i>Daniel Gregorek, Sandesh Srinivas, Suhail Nasrulla, Steffen Paul, Ralf Bachmayer</i> | |
| Improving Hydrophone Preamp Performance with Bias Resistor Feedback..... | 1660 |
| <i>Jay Abel</i> | |
| Integrated Computing System for Real-Time Data Processing, Storage and Communication with Large Aperture 160-Element Coherent Hydrophone Array..... | 1666 |
| <i>Hamed Mohebbi-Kalkhoran, Matthew Schinault, Nicholas C. Makris, Purnima Ratilal</i> | |
| Diversity Schemes for a Large MIMO Acoustic Transmitter on a C2000 Micro-Controller | 1675 |
| <i>Joseph Hall, Y. Rosa Zheng</i> | |
| Feature Engineering and Classification of Elastic Waves from Partial Wave Simulations of Active Sonar Targets | 1684 |
| <i>Betnice Kubicek, Ananya Sen Gupta, Ivars Kirsteins</i> | |
| Braid Manifold Discovery Using Temporal Graph Networks | 1689 |
| <i>Andrew Christensen, Ananya Sen Gupta, Ivars Kirsteins</i> | |
| Modular Multi-Sensor Fusion for Underwater Localization for Autonomous ROV Operations..... | 1693 |
| <i>Martin Scheiber, Alexandre Cardaillac, Christian Brommer, Stephan Weiss, Martin Ludvigsen</i> | |
| Storm Wave Modeling in the Gulf of Mexico Using Nested WAVEWATCH III Model: A Case Study for Hurricane Ida (2021) | 1698 |
| <i>C. Gowri Shankar, Mustafa Kemal Cambazoglu, Azadeh Razavi Arab, Diana N. Bernstein, Jeremy David Wiggert</i> | |
| Performance Characteristics of a Catamaran in Transforming Near-Shore Waters..... | 1706 |
| <i>Kayhan Ulgen, Manhar R. Dhanak</i> | |
| Assessing Tropical Cyclone Tracks in the Bay of Bengal | 1713 |
| <i>Nahruma Mehzebain Pieu, A. K. M. Saiful Islam, Mohan Kumar Das, Faruque Abdullah</i> | |
| Investigative Methods to Assess a Drone-Based, Topobathy LiDAR Sensor for Shallow-Water Munitions Response | 1718 |
| <i>Jeffrey P. Thayer, Gerald Thompson, Kevin W. Sacca, Alexandra K. Wise</i> | |
| Web-Based Visualization of Integrated Next-Generation S-100 Hydrographic Datasets..... | 1725 |
| <i>Thomas Butkiewicz, Ilya Atkin, Briana Sullivan, Christos Kastrisios, Andrew Stevens, Kindrat Beregovyi</i> | |
| A Low-Flow Marine Hydrokinetic Turbine for a Floating Unmanned Mobile Platform | 1732 |
| <i>Adriana McKinney, Adam Hall, Hugo Pimentel, Hayley Rienzo, John Frankenfield, Pierre- Phillip Beaujean, Manhar Dhanak</i> | |

| | |
|--|------|
| Unscented Kalman Filtering on Manifolds for AUV Navigation - Experimental Results..... | 1738 |
| <i>Stephen T. Krauss, Daniel J. Stilwell</i> | |
| Multi-Objective Optimization of Sensor Placement in a 3D Body for Underwater Localization | 1744 |
| <i>Paula A. Graça, José C. Alves, Bruno M. Ferreira</i> | |
| Development of the Sewer-Pipe Sediment-Monitoring System to Prevent Urban Flooding..... | 1751 |
| <i>Jeongyong Park, Junho Lee, Chungkuk Jin, Hansung Kim, Moohyun Kim</i> | |
| High-Bandwidth Acoustic Data Communication for Stand-Off Identification by Autonomous Underwater Vehicles..... | 1755 |
| <i>Henry Dol, Koen Blom, Martijn Van Riet, Jeroen Van De Sande</i> | |
| Modeling the Dynamics of an Autonomous Underwater Vehicle (AUV) Towing Another AUV with a Marine Cable | 1765 |
| <i>Omotayo Oladele, Stefano Brizzolara</i> | |
| Development of a Cloud-Based Data Match-Up Service (CDMS) in Support of Ocean Science Applications..... | 1771 |
| <i>Nga Chung, Thomas Cram, Shawn R. Smith, Vardis M. Tsontos, Thomas Huang, Kimberly Sparling, Stepheny Perez, Wai Phyoo, Zaihua Ji, Riley Kuttruff</i> | |
| Towards Understanding Underwater Weather Events in Rivers Using Autonomous Surface Vehicles..... | 1777 |
| <i>Alice K. Li, Yue Mao, Sandeep Manjanna, Sixuan Liu, Jasleen Dhanoa, Bharg Mehta, Victoria M. Edwards, Fernando Cladera Ojeda, M. Ani Hsieh, Maël Le Men, Eric Sigg, Douglas J. Jerolmack, Hugo N. Ulloa</i> | |
| Easy-Turb: Light-Weight Cost-Effective Turbidity Sensors for Distributed Underwater Sensing Systems..... | 1785 |
| <i>Parker Wilmoth, Prabha Sundaravadivel</i> | |
| In-Situ Data from Two 1500+ Sub-Mesoscale near-Lagrangian Float Deployments Across 14 Different Sensor Types | 1789 |
| <i>Jeffrey S. Ellen</i> | |
| Extended Deployment of an Automated Coastal Environment Monitoring System | 1796 |
| <i>Kevin Bennett, Arianna Ilvonen, Andrew Bennett</i> | |
| Design and Testing of an Autonomous Cable Mounted Aquaculture Robot | 1805 |
| <i>Arianna Ilvonen, Kevin Bennett, Andrew Bennett</i> | |
| BlueBuzz, an Open-Source Acoustic Modem | 1810 |
| <i>Scott Mayberry, Jinzhi Cai, Fumin Zhang</i> | |
| Assessment of the Impact of the Variability of Freshwater Input and Land-Sea Breeze on the Mississippi Sound Using a Modeling Approach..... | 1817 |
| <i>Shihab Hossain Saran, Mustafa Kemal Cambazoglu, Brandy N. Armstrong, Diana N. Bernstein, Jerry D. Wiggert</i> | |
| 3D Reconstruction of Reefs Using Autonomous Surface Vessels and an Analysis of Chain Vs 3D Rugosity Measurement Robustness..... | 1826 |
| <i>Derek Benham, Aaron Newman, Kalai Ellis, Richard Gill, Joshua G. Mangelson</i> | |
| A Physics-Based Echosounder Inversion for Wide-Area Assessment of Sediment Properties | 1835 |
| <i>Brian T. Hefner, Guangyu Xu, Darrell R. Jackson, Anatoliy N. Ivakin, Gorm Wendelboe</i> | |

| | |
|--|------|
| An Experimental and Analytical Study on Wave-Structure Interaction | 1841 |
| <i>Lauren Breitingler, Alden Fitts, Sarah Mouring, Tori Tomiczek</i> | |
| Improvement of Wind Data Quality for Extreme Wave Generation Over the Northern Gulf of Mexico..... | 1847 |
| <i>Azadeh Razavi Arab, Diana N. Bernstein, C. Gowri Shankar, Mustafa Kemal Cambazoglu, Jeremy David Wiggert</i> | |
| Gradient-Based Adaptive Navigation of Multiple Diving Autonomous Surface Vehicles | 1853 |
| <i>Max Woolsey, Christopher A. Kitts, Michael A. Neumann</i> | |
| Water Quality Impacts from Tidal Flooding in Southern Chesapeake Bay | 1861 |
| <i>Margaret R. Mulholland, Alfonso Macías-Tapia, J. Derek Loftis</i> | |
| Seafloor Imaging Lessons Learned from Over a Decade of Surveys with SeaBED AUVs | 1866 |
| <i>Max Woolsey, M. Elizabeth Clarke, Allison Woolsey, Roy Jarnagin</i> | |
| Quantifying Sidescan Sonar Positioning Accuracy, with Special Reference to Measurement in the Intertidal Zone | 1876 |
| <i>K. G. Foote, M. Borrelli, J. J. Johnson, B. Legare, B. McCormack, S. McFarland, D. Solazzo</i> | |
| Subsea Environmental Acoustic Monitoring Using Long Range Autonomous Underwater Vehicles..... | 1882 |
| <i>Jacqueline Nichols, Adrian Woodroffe, Eric Jackson, Alex Johnson, Manuel Morgan</i> | |
| Sidescan Sonar Calibration by Bottom Arrays of Standard Targets | 1886 |
| <i>Kenneth G. Foote</i> | |
| Numerical Study of the Hydrodynamics of Mangrove-Inspired Structures for Coastal Protection | 1892 |
| <i>Jhon J. Quiñones, Helber Antonio Esquivel-Puentes, Johnson O. Nelson, Oscar Curet, Luciano Castillo</i> | |
| Underwater Acoustic Channel Prediction in delay-Doppler Domain Based on Reinforcement Learning | 1903 |
| <i>Sixu Wang, Wei Li, Rongrong Guo</i> | |
| Multi-Modal Lake Sampling for Detecting Harmful Algal Blooms..... | 1910 |
| <i>Ibrahim Salman, Nare Karapetyan, Archana Venkatachari, Alberto Quattrini Li, Annie Bourbonnais, Ioannis Rekleitis</i> | |
| Motion Compensation of Opean-Ocean Acoustic Doppler Velocimeter Measurements for Offshore Turbulence Assessment | 1919 |
| <i>Michael Joseph Govea, James H. Vanzwieten, Alexander Mink, Gabriel Alsenas, Frasher Dalgleish, Yufei Tang</i> | |
| Ocean Acoustic Data Collection - Community-Based Methods for Meeting Community Needs..... | 1927 |
| <i>Ryan Flagg, Jasper Kanes, Lucianne Marshall, Kiyomi Holman, Desiree Bulger, Jillian Duggan</i> | |
| Iterative Doubly-Spread Channel Estimation Based on Reinforcement Learning for Underwater Acoustic Communication | 1933 |
| <i>Rongrong Guo, Wei Li, Zhonghan Hao</i> | |
| Multiple Objective Optimization for Fully Adaptive Active Sonar..... | 1938 |
| <i>Jeff Tucker, Vaibhav Chavali, Kathleen E. Wage, Jill K. Nelson</i> | |

| | |
|--|------|
| Novel Application of ICESat-2 ATLAS Data to Determine Coastal Light Attenuation as a Proxy for Suspended Particulate Matter..... | 1947 |
| <i>Emily Eidam, Catherine Walker, Kelsey Bisson, Matthew Paris, Lillian Cooper</i> | |
| Adaptive Mode Filtering for Arctic Environments..... | 1954 |
| <i>Bhargabi Chakrabarti, Kathleen E. Wage</i> | |
| Cost–Benefit Analysis of Metavariable Variation in Convolutional Autoencoders Applied to Acoustic Backscattering Data from Small Underwater Targets..... | 1961 |
| <i>Timothy Linhardt, Ananya Sen Gupta</i> | |
| Time and Cost-Efficient Bathymetric Mapping System Using Sparse Point Cloud Generation and Automatic Object Detection..... | 1965 |
| <i>Andres Pulido, Ruoyao Qin, Antonio Diaz, Andrew Ortega, Peter Ifju, Jaejeong Jane Shin</i> | |
| Efficient Ship Detection in Synthetic Aperture Radar Images and Lateral Images Using Deep Learning Techniques..... | 1973 |
| <i>Athira Nambiar, Ashish Vaigandla, Suresh Rajendran</i> | |
| Low-Cost Unmanned Underwater Vehicles for Multi-Vehicle Autonomy Testing..... | 1983 |
| <i>Natalya Gage, Chris Tomaszewski, Shaun Anderson, Sean Wilson</i> | |
| Open Innovation and Achieving Balance for a Sustainable Blue Economy..... | 1990 |
| <i>Judith Underwood, Nathan Stempel</i> | |
| Closed-Loop-Flight-Based Combined Geometric and Structural Wing Design Optimization Framework for a Marine Hydrokinetic Energy Kite..... | 1994 |
| <i>Sumedh Beknalkar, Kartik Naik, Chris Vermillion, Andre Mazzoleni</i> | |
| System for Wireless Charging of Battery-Powered Underwater Sensor Networks..... | 2004 |
| <i>Urvi Ahluwalia, Gabriel Chenevert, Ujjwal Pratik, Zeljko Pantic</i> | |
| OysterSim: Underwater Simulation for Enhancing Oyster Reef Monitoring..... | 2012 |
| <i>Xiaomin Lin, Nitesh Jha, Mayank Joshi, Nare Karapetyan, Yiannis Aloimonos, Miao Yu</i> | |
| Demonstration of a Towed Coaxial Turbine Subscale Prototype for Hydrokinetic Energy Harvesting in Skew..... | 2018 |
| <i>Saurabh Agrawal, Vinson Oliver Williams, Xinyang Tong, Mehedi Hassan, Mike Muglia, Matthew Bryant, Kenneth Granlund, Praveen Ramaprabhu, Andre P. Mazzoleni</i> | |
| Learning-Based Autonomous Underwater Vehicle Navigation Following Human Actions in Confined Environment..... | 2026 |
| <i>Tianchen Liu, Miao Yu, Nikhil Chopra</i> | |
| Development of a Three-Dimensional Simulator for Integrated Testing of Path-Planners and Controllers for Autonomous Underwater Vehicles..... | 2034 |
| <i>Abhiram Kondapalli, Payal Nandi, Krishnanand Kaipa</i> | |
| Securing Route Discovery for the Underwater Internet of Things..... | 2044 |
| <i>Daniel J. Jakubisin, Connor McPeak, Jamie Sloop, Bradley Davis</i> | |
| Using a Rigid Gripper on Objects of Different Compliance Underwater..... | 2054 |
| <i>Katie Sullivan, Howard Chizeck, Aaron Marburg</i> | |
| Preliminary Investigation of Podded Appendages on a Non Body-Of-Revolution Submersible at Depth..... | 2058 |
| <i>Jonathan S. Gibbs, Teresa F. Collins, Arianna O. Smith, Meade J. Tolen, Spencer D. Eves</i> | |

| | |
|--|------|
| Head-On Object Size Determination Using a Forward Looking Sonar for Obstacle Avoidance | 2066 |
| <i>Alexander J. Fedorovich, Joseph T. Klamo, Sean P. Kragelund</i> | |
| Advanced Modeling Techniques for Mission Planning of Marine Multi-Vehicles Systems: What's Next? | 2074 |
| <i>Alberto Luvisutto, Mattia Miolato, Omar Almaleki, Alya Al Marzooqi, Emiliano Traversi, Giulia De Masi</i> | |
| Multisensor Fusion for Marine Infrastructures' Inspection and Safety | 2080 |
| <i>Vidya Sudevan, Nikita Mankovskii, Sajid Javed, Hamad Karki, Giulia De Masi, Jorge Dias</i> | |
| MIMO-OFDM Over a 10km Acoustic Link: An Experimental Study at the Suruga Bay, Japan | 2087 |
| <i>Zhengnan Li, Alicia Bel Ventosa, Diego A. Cuji, Yukihiro Kida, Mitsuyasu Deguchi, Takuya Shimura, Milica Stojanovic</i> | |
| Global Ocean Studies from ICESat-2 Mission | 2091 |
| <i>Xiaomei Lu, Yuekui Yang, Yongxiang Hu, Laura Rogers, Ali Omar</i> | |
| State of Art and Economic Evaluation of Wave Energy Converters: a Case Study | 2096 |
| <i>Marco Trapanese, Daniele Milone, Pierluca Martorana, Dhirendran Munith Kumar, Francesco Maria Raimondi, Claudio Nevoloso</i> | |
| Reduction of Cogging Force in Linear Generators for Wave Energy Harvesting | 2102 |
| <i>Domenico Curto, Vincenzo Franzitta, Alfredo Iones, Leonardo Iraci, Enzo Giuseppe Munna, Manuela Scozzaro, Claudio Nevoloso, Marco Trapanese</i> | |
| Energy Assessment of a Wave Energy Converter in a Small Island: a Case Study | 2109 |
| <i>Miriam Di Vittorio, Andrea Guercio, Pierluca Martorana, Dhirendran Munith Kumar, Daniele Milone, Marco Trapanese</i> | |
| Phase Ambiguities in Synthetic Aperture Sonar Interferometry | 2115 |
| <i>Torstein Olsmo Sæbø, Roy Edgar Hansen, Stig Asle Vaksvik Synnes</i> | |
| Evaluation of the NOAA Operational Forecast System in Delaware Bay | 2125 |
| <i>Hugh Roarty</i> | |
| Comparing the Performance of Convolutional Neural Networks Trained to Localize Underwater Sound Sources | 2129 |
| <i>Ryan Herchig, Nicholas Palermo, Peter Gerstoft, Timothy Daniel, Daniel Sternlicht</i> | |
| Influence of Transmitting Directivity on Underwater Acoustic Communication System | 2136 |
| <i>Hong Xu, Zhengyao He, Jingshang Gao, Pengkun Zhao, Qiang Shi</i> | |
| Research on Transmitting Directivity of Combined Low-Frequency Bender Disk Transducer | 2141 |
| <i>Qiang Shi, Zhengyao He, Hong Xu</i> | |
| Study of Taiwanese White Dolphins Detection and Tracking Techniques by Utilizing Autonomous Unmanned Aerial Vehicles | 2145 |
| <i>Ting-Yuan Chien, Chi-Fang Chen, Zhi-Yu Chen</i> | |
| Active Deep Learning Technique for Underwater Target Recognition | 2155 |
| <i>Jiankun Lyu, Longyu Jiang, Chao Yang, Shijie Wang</i> | |
| Adaptive Comb Waveform Design for Reverberation Suppression | 2164 |
| <i>David A. Hague</i> | |

| | |
|---|------|
| QA/QC Protocols and Documentation for Ocean Data – a Case for Standardization? | 2172 |
| <i>Christoph Waldmann, Mark Bushnell, Eugene Burger, Robert Huber</i> | |
| Clustering Underwater Sound Speed Profiles Via Elastic Shape Metric and Elastic Partial Matching..... | 2176 |
| <i>Darshan Bryner, Jose Salas, J. Ryan McDowell, John Bono, Daniel Sternlicht</i> | |
| Techno-Economic Implications of Electrical Machine Scaling for Wave Energy Converters | 2186 |
| <i>Aryana Y. Nakhai, Ben McGilton</i> | |
| LIDAR-Based USV Close Approach to Vessels for Manipulation Purposes | 2192 |
| <i>Fausto Ferreira, Natko Kraševac, Juraj Obradovic, Robert Milijaš, Ivan Loncar, Stjepan Bogdan, Nikola Miškovic</i> | |
| AUV-Enabled Data Collection for Underwater Acoustic Sensor Networks..... | 2198 |
| <i>Chengbohao Zhang, Yiyin Wang, Lingya Liu, Lei Yan</i> | |
| Research on Key Technology of Unmanned Surface Vehicle Motion Simulation Based on Unity3D..... | 2204 |
| <i>Wenhao Gan, Xiuqing Qu, Dalei Song, Hongxiu Sun, Tingting Guo, Wei Bao</i> | |
| Research on a Vectored Thruster Based on 3RRUR for Micro AUVs | 2209 |
| <i>Tao Liu, Zihao Wang, Fangye Li, Jianming Miao, Lingji Xu</i> | |
| A Real-Time Identification Method Based on Static-Dynamic Optical Flow Features for Deep-Sea Hydrothermal Plumes..... | 2216 |
| <i>Keren Xie, Tiefeng Li, Yiming Liang, Yanyan Zhang</i> | |
| Integrated Approach for Modeling Acoustic Propagation and Projectors/Hydrophones Electronics | 2221 |
| <i>Rúben Viegas, Daniel Pozzatti, Friedrich Zabel, António J. Silva</i> | |
| Underwater Image Imbalance Attenuation Compensation Based on Attention and Self-Attention Mechanism | 2227 |
| <i>Danxu Wang, Yanhui Wei, Junnan Liu, Wenjia Ouyang, Xilin Zhou</i> | |
| Automatic Control for Adaptive Lighting System for Underwater Photogrammetry Image Acquisition | 2233 |
| <i>Renzo Mendoza, Dario Huanca, Daniel Menacho, Diego Arce</i> | |
| Performance Comparison of JANUS and CSK Using WATERMARK Channel Replay Simulator | 2237 |
| <i>T P Sameer Babu, K B Akhil, R. David Koilpillai</i> | |
| Evaluation of Low Power Wi-Fi Modules in Emulated Ocean Environments | 2242 |
| <i>Gabriel Chenevert, Abhilash Arora, Zeljko Pantic</i> | |
| Early Prediction of Seasonal Atlantic Hurricanes Using Sea Surface Temperature Maps and Neural Networks | 2247 |
| <i>Antonia Comaniciu, Hiroyuki Murakami</i> | |
| Piezoelectric Transducer Inventions in the Last Two Decades..... | 2252 |
| <i>Tian-Bing Xu</i> | |
| Real-Time Video Transmission Through Underwater MIMO Acoustic Communication Channels..... | 2264 |
| <i>Xiyuan Zhu, Jinfeng Li, Y. Rosa Zheng</i> | |
| Multisensor Platform for Underwater Object Detection and Localization Applications | 2269 |
| <i>Fabian John, Sven Ole Schmidt, Horst Hellbrück</i> | |

| | |
|---|------|
| Progressive Hierarchical Encoding for Image Transmission in Underwater Environments..... | 2276 |
| <i>Antoni Burguera, Francisco Bonin-Font</i> | |
| Autonomous Underwater Acoustic Localization Through Multiple Unmanned Surface Vehicle | 2282 |
| <i>Ching-Tang Hung, You-Cheng Zhang, Chi-Fang Chen</i> | |
| Surface Current Observations from a Combined CODAR/WERA High-Frequency Radar Array Along the North Carolina Coast During the Processes Driving Exchange at Cape Hatteras (PEACH) Project..... | 2287 |
| <i>Harvey Seim, Dana Savidge, Mike Muglia, Sara Haines, Lu Han</i> | |
| Investigating the Training of Convolutional Neural Networks with Limited Sidescan Sonar Image Datasets | 2291 |
| <i>Yannik Steiniger, Jannis Stoppe, Dieter Kraus, Tobias Meisen</i> | |
| 1Gbps X 100m Underwater Optical Wireless Communication Using Laser Module in Deep Sea | 2297 |
| <i>Shojiro Ishibashi, Ken-Ichi Susuki</i> | |
| Water Referenced Doppler Velocity Aiding for AUV Navigation..... | 2304 |
| <i>Kjetil Bergh Anonsen, Magne Mandt</i> | |
| Optimization of Sensing Locations of Autonomous Underwater Vehicles for Optimal Environmental Prediction and Acoustic Target Tracking | 2312 |
| <i>Weicong Zhan, Yu Tian, Qiming Sang, Feng Zheng, Qianlong Jin, Jiancheng Yu</i> | |
| On the Localization of an Acoustic Target Using a Single Receiver | 2320 |
| <i>Bruno Ferreira, José Alves, Nuno Cruz, Paula Graça</i> | |
| Evaluation of an Electrical Impedance Tomography Model for Underwater Object Detection | 2326 |
| <i>Sven Ole Schmidt, Fabian John, Horst Hellbrück</i> | |
| Miniature Underwater Glider Hydrodynamic Performance | 2332 |
| <i>Moustafa Elkolali, Youssef Mahran, Ahmed Al-Tawil, Alex Alcocer</i> | |
| Obstacle Detection of Unmanned Surface Vehicle Based on Lidar Point Cloud Data | 2337 |
| <i>Lihui Deng, Tingting Guo, Hongjian Wang, Zhikang Chi, Zhiqiang Wu, Rubin Yuan</i> | |
| Underwater Time of Flight Camera Ranging with Backscatter Phasor Subtraction..... | 2345 |
| <i>Austin Jantzi, William Jemison, Prashant Athavale, Mahesh Banavar, Erik Bollt, Luke Rumbaugh, David Illig</i> | |
| The Application of Computational Geometry for Automated UUV Mission Planning | 2352 |
| <i>Hunter C. Brown, John V. Sloat</i> | |
| An Automated Data Processing Pipeline for Coral Reef Monitoring..... | 2359 |
| <i>Yee Wang Sui, Koh Xian Ming, Malika Meghjani, Nagarajan Raghavan, Cyrille Jegourel, Keegan Kang</i> | |
| Low Bitrate Underwater Video Coding for Object Recognition | 2365 |
| <i>Jiawei Luo, Tiesong Zhao, Jielian Lin, Weiling Chen, Rongxin Zhang</i> | |
| Towards Robot-Aided Diver Navigation in Mapped Environments (ROADMAP)..... | 2370 |
| <i>Dula Nad, Fausto Ferreira, Igor Kvasic, Luka Mandic, Vladimir Slošic, Christopher Walker, Derek Orbaugh Antillon, Iain Anderson</i> | |

| | |
|---|------|
| Introducing the Hampton Roads Seismic Network: Minimizing the Risk of Injection-Induced Seismicity in Virginia | 2375 |
| <i>Ryan M. Pollyea, Martin C. Chapman, Cameron R. Chambers, Ethan Conley, Monique Holt, Dan Holloway, Jamie Heisig-Mitchell</i> | |
| Surface Current Coverage of the Mid Atlantic United States | 2383 |
| <i>Hugh Roarty, Chris Shivoock</i> | |
| Simultaneous in Situ Nitrate and Orthophosphate Measurement Using a Dual Chemistry Microfluidic Sensor | 2388 |
| <i>Edward Luy, James Smith, Iain Grundke, Colin Sonnichsen, Sean Morgan, Arnold Furlong, Vincent Sieben</i> | |
| Low-Cost, Intelligent Drifter Fleet for Large-Scale, Distributed Ocean Observation | 2396 |
| <i>Eric Cocker, Julie A. Bert, Francisco Torres, Matthew Shreve, Jamie Kalb, Joseph Lee, Michael Poimboeuf, Paloma Fautley, Samuel Adams, Joanne Lee, Jengping Lu, Chris Chua, Norine Chang, Steven Neltner, Michael Gray</i> | |
| Use Case Analysis for Maritime Domain Awareness Tools..... | 2404 |
| <i>Chris Shivoock, Hugh Roarty</i> | |
| Near Real-Time Radio Frequency (RF) Data Analysis Pipeline for Aiding Marine Domain Awareness and Surveillance | 2409 |
| <i>Soumyashree Kar, Vishwamithra Sunkara, Jason McKenna, Steve Stanic, Landry Bernard</i> | |
| OTFS and OCDM Based Underwater Acoustic Communication: System Design and Evaluation..... | 2417 |
| <i>T. P. Sameer Babu, Jobin Francis, R. David Koilpillai</i> | |
| H-SURF: Heterogeneous Swarm of Underwater Robotic Fish | 2423 |
| <i>Saverio Iacoponi, Godfried Jansen Van Vuuren, Gaspare Santaera, Nikita Mankovskii, Igor Zhilin, Federico Renda, Cesare Stefanini, Giulia De Masi</i> | |
| A Method to Autonomously Estimate Transect Orientation to Minimize Pitch of a Lightweight Uncrewed Surface Vehicle..... | 2428 |
| <i>Valeria Heredia, Robin Murphy</i> | |
| Improvements to Automated Change Detection Tools for SAS Images..... | 2433 |
| <i>Anna Crawford, Roy Hansen, Shawn Johnson, Jonathan King, Øivind Midtgaard, Torstein Sæbø, Jose Salas, Emma Shouldice, Sonja Smith, Daniel Sternlicht, Denton Woods</i> | |
| Improving the Chemical and Physical Properties of Ceramic Non-Conductive Coatings | 2439 |
| <i>Duszkiewicz, Ramotowski</i> | |
| Open-Source Software to Support High Frequency Radar Data Analysis and Quality Control..... | 2446 |
| <i>Michael Joseph Smith, Teresa Updyke, Sara Haines</i> | |
| Teleoperation of Remotely Operated Vehicles: Development, Challenges, and Future Directions..... | 2450 |
| <i>Allisa J. Dalpe, Stefano Suman, Michael V. Jakuba, Andrew Bowen</i> | |
| Evaluation of Two Depth-Holding Algorithms for a Buoyancy-Controlled Coastal Float..... | 2457 |
| <i>Trevor Harrison, Alex Ziemann, Jessica Noe, Brittani Shappell, Kristi Morgansen</i> | |
| A Miniaturized and Automated eDNA Sampler: Application to a Marine Environment..... | 2466 |
| <i>Andre Hendricks, Connor Mackie, Edward Luy, Colin Sonnichsen, Lee Miller, Mark Wright, Iain Grundke, James Smith, Joshua Creelman, Mahtab Tavasoli, Arnold Furlong, Robert G. Beiko, Julie Laroche, Vincent Sieben</i> | |

| | |
|--|------|
| NASA's Earth Information System: Sea-Level Change | 2476 |
| <i>Denis Felikson, Ian Fenty, Ben Hamlington, Alexey Shiklomanov, Carmen Blackwood, Mark Carroll, Michael Croteau, Cedric David, Kyla Drushka, Daniel Duffy, J. Thomas Farrar, Gael Forget, Severine Fournier, Thomas Frederikse, Ichiro Fukumori, Alexandre Guillaume, Patrick Heimbach, Thomas Huang, Eric Larour, Kyo Lee, Jian Li, Brooke Medley, Sophie Nowicki, Justin Quinn, Ramon Ramirez-Linan, Richard Ray, Mike Rilee</i> | |
| CEOS COAST: Progress on the Chesapeake Bay Pilot and Future Work..... | 2484 |
| <i>Merrie Beth Neely, Nikolay Nezlin, Rachel Lazzaro, Robbie Bishop-Taylor, Steven Saga, Paul M. DiGiacomo, Rashmi Sharma</i> | |
| A Deep Learning Algorithmic Approach to Develop a Video Inundation Monitoring System | 2489 |
| <i>J. Derek Loftis, Sridhar Katragadda</i> | |
| Overview and Practical Evaluation of Sonar-Based Collision Avoidance Approaches for AUVs | 2494 |
| <i>Thomas Cimiega, Lasse Boenecke, Sabah Badri-Hoehler</i> | |
| Assessing the Capacity of Pelagic Sharks to Serve as Ocean Observing Platforms in the Mid-Atlantic Bight and Beyond | 2503 |
| <i>Caroline Wiernicki, Tobey Curtis, Barbara Block, Matthew Oliver, Aaron Carlisle</i> | |
| The Use of High Frequency Radar Data with Models..... | 2511 |
| <i>Teresa Updyke</i> | |
| Visualizing and Distributing Decades of Satellite Ocean Remote Sensing Data Products..... | 2516 |
| <i>Michael Soracco</i> | |
| Advancing Raman Techniques for Ocean Applications | 2521 |
| <i>Anna Kolomijeca, William Kirkwood, Laura Arevalo Diaz, Ralf Bachmayer</i> | |
| Advanced Power Take-Off and Conversion System for Submerged Ocean Wave Energy Convertors | 2530 |
| <i>Alexander Hatfield, Bingqi Zhao, Mileta Tomovic, Tian-Bing Xu</i> | |
| Assessing Carbon Properties in Coastal Waters with a New Observing System Testbed..... | 2535 |
| <i>J. Blake Clark, Stephanie Schollaert Uz, Vardis Tsontos, Thomas Huang, Joel Scott, Laura Rogers</i> | |
| Design and Evaluation of a Compact Correlation Velocity Log for Small Underwater Vehicles..... | 2541 |
| <i>Thomas E. Blanford, Daniel C. Brown, Richard J. Meyer</i> | |
| Under-Ice Field Tests with an AUV in Abisko/Torneträsk | 2551 |
| <i>Marc Hildebrandt, Tom Creutz, Bilal Wehbe, Marius Wirtz, Michael Zipper</i> | |
| Development of a High-Power Multilayer PVDF Acoustic Projector for 40 to 80 kHz Band | 2558 |
| <i>António Silva, Ashley Hughes, Daniel Pozzatti, Friedrich Zabel, Rúben Viegas, Marcos S. Martins</i> | |
| An Introduction and Initial Assessment of Uncrewed Systems Standards as a Catalyst for Data Interoperability | 2564 |
| <i>Andrew Evans, Katharine Weathers</i> | |
| Synthetic Sonar Image Simulation with Various Seabed Conditions for Automatic Target Recognition | 2568 |
| <i>Jane Shin, Shi Chang, Matthew J. Bays, Joshua Weaver, Thomas A. Wettergren, Silvia Ferrari</i> | |

| | |
|--|------|
| MARUS - A Marine Robotics Simulator..... | 2576 |
| <i>Ivan Loncar, Juraj Obradovic, Natko Kraševac, Luka Mandic, Igor Kvasic, Fausto Ferreira, Vladimir Slošic, Đula Nad, Nikola Miškovic</i> | |
| ICESat-2 Mission: Contributions of a Spaceborne Lidar to Ocean Science..... | 2583 |
| <i>Thomas Neumann, Lori Magruder, Nathan Kurtz</i> | |
| Development of a Mid-Atlantic Surf Hazards Awareness and Research Coordination: Collaborating to Improve the Forecasting, Understanding, and Prevention of Surf Hazards..... | 2588 |
| <i>Kathleen M. Fallon, Mary Ford</i> | |
| Mixed-Variable Tuning with Particle Swarm Optimization | 2593 |
| <i>Benjamin McLaughlin, Bradley Marchand</i> | |
| Utilizing Numerical Simulation to Understand the Implications of Injection-Induced Seismicity for Managed Aquifer Recharge in Coastal Virginia | 2603 |
| <i>Ethan Conley, Cameron R. Chambers, Jamie Heisig-Mitchell, Dan Holloway, Ryan M. Pollyea</i> | |
| Image Segmentation and Mapping in an Underwater Environment Using an Imaging Sonar | 2611 |
| <i>Paulo M. Gonçalves, Bruno M. Ferreira, José C. Alves, Nuno A. Cruz</i> | |
| Unmanned Aerial Vehicle for Wind-Turbine Inspection. Next Step: Offshore..... | 2619 |
| <i>A. Dias, J. Almeida, A. Oliveira, T. Santos, A. Martins, E. Silva</i> | |
| Volatility Estimation for Improved Infilling of Missing Significant Ocean Wave Height Data from High-Frequency Surface Wave Radar | 2625 |
| <i>Reza Shahidi, Eric W. Gill</i> | |
| Design and Validation of a System of Autonomous Fish Tracking Vehicles | 2629 |
| <i>Nikolai Lauvås, Henning Andre Urke, Jo Arve Alfredsen</i> | |
| Remote Operating Vehicle Observation Data Contributions to the Ocean Biodiversity Information System | 2639 |
| <i>Sean Tippett, Reyna Jenkyns, Melissa Macarthur, Mac Button, Tianming Wei</i> | |
| Synthetic Data for Semantic Segmentation in Underwater Imagery | 2646 |
| <i>Michael Pergeorelis, Maxim Bazik, Philip Saponaro, Joong Kim, Chandra Kambhamettu</i> | |
| High-Resolution Digital Elevation Model Development to Support Emergency Preparedness in Haida Gwaii, British Columbia, Canada | 2652 |
| <i>Adrienne Shumlich, Mark Rankin, Cassandra Bosma, Soroush Kouhi, Reza Amouzgar</i> | |
| A SMACC Based Mission Control System for Autonomous Underwater Vehicles | 2658 |
| <i>David Carvalho, Alfredo Martins, José Miguel Almeida, Eduardo Silva</i> | |
| An Integrated Hydrophone Calibration System for Ocean Observing: ONC HydroCal | 2668 |
| <i>Ben Biffard, Manuel Morgan, Lanfranco Muzi, Tom Dakin, Peter Van Buren</i> | |
| The Blue Economy: An Imperative for Investment in Information from Ocean Monitoring and Exploration Using Remote Sensing..... | 2673 |
| <i>Maurice Estes, Frank Muller-Karger, Gerhard Kuska, Richard Bernknopf, Laura Rogers, Mary Ford</i> | |

| | |
|--|------|
| ICESat-2 Bathymetry: Advances in Methods and Science..... | 2685 |
| <i>Christopher E. Parrish, Lori Magruder, Ute Herzfeld, Nathan Thomas, Jonathan Markel, Michael Jasinski, Gretchen Imahori, Joan Herrmann, Thomas Trantow, Adrian Borsa, Rick Stumpf, Bryan Eder, Isabel Caballero</i> | |
| Cross-Evaluation of Waveform Modulation Schemes Using Post-Experimental Field Data for Underwater Acoustic Communications | 2691 |
| <i>Yukang Xue, Y. Rosa Zheng</i> | |
| Vehicle Motion-Related Noise Mitigation Analyses of a Waveglider Towed Array System for Passive Acoustic Marine Mammal Monitoring | 2697 |
| <i>Vincent E. Premus, Philip A. Abbot, Charles J. Gedney</i> | |
| Trade off Between the Probability of Detection and False Alarm Rate in Fish Tag Detection..... | 2702 |
| <i>Weihang Guo, Y. Rosa Zheng</i> | |
| OceansMap – a Data Integration and Web-Based Model Validation Tool for NOAA CO-OPS..... | 2707 |
| <i>James Doyle, K. Knee, M. Iannucci, A. Nguy, K. Martin, N. Delli-Carpini, Chris Paternostro, Gerhard Kuska, M. Ford, Jeff Hanson, Emily Patroliia</i> | |
| A Flexible Simulation Platform for Multimodal Underwater Wireless Communications Using Ns-3..... | 2717 |
| <i>João Pedro Loureiro, Filipe B. Teixeira, Rui Campos</i> | |
| Acoustic Modeling for Volumetric Sonar Systems..... | 2723 |
| <i>Daniel C. Brown, Shawn F. Johnson, Jason H. Philtron, Cale F. Brownstead</i> | |
| High Frequency Radars as Ecological Sensors: Using Lagrangian Coherent Structures to Quantify Prey Concentrating Features..... | 2728 |
| <i>Jacquelyn Veatch, Erick Fredj, Josh Kohut</i> | |
| Anomaly Detection in Complex Data: A Practical Application When Outliers Are Few | 2735 |
| <i>Zelalem Engida, Herminio Foloni Neto, Alex Slonimer, Jeannette Bedard, Fahim Sahariar Alam, Andrew M Snauffer</i> | |
| Detecting Weak Signals Using a Fractional Fourier Transform-Based Stochastic Matched Filter for Active Sonars | 2742 |
| <i>Shuyao Lan, Cheng Chi, Chunhua Zhang</i> | |
| Coherent Phase Shift Keying (PSK) Modulation Using Low-Power Micro-Controllers for Underwater Acoustic Communications | 2750 |
| <i>Alexis Soulias, Yukang Xue, Y. Rosa Zheng</i> | |
| Training a Machine Learning Model for Underwater Chemical Source Localization in Simulated Turbulent Flows..... | 2756 |
| <i>Hau Phan, Michael J. Wardlaw, Bruce Kim, Austin J. Brockmeier</i> | |
| Comparison of Ocean Model and HF Radar Surface Currents..... | 2766 |
| <i>Tasnim Islam, Stephan D. Howden, Arne R. Diercks, Mustafa Kemal Cambazoglu</i> | |
| High-Performance Visualization for Ocean Modeling | 2771 |
| <i>Wael H. Ali, Youran Gao, Corbin Foucart, Manan Doshi, Chris Mirabito, Patrick J. Haley, Pierre F. J. Lermusiaux</i> | |
| Incremental Low-Rank Dynamic Mode Decomposition Model for Efficient Forecast Dissemination and Onboard Forecasting..... | 2781 |
| <i>T. Ryu, W. H. Ali, P. J. Haley, C. Mirabito, A. Charous, P. F. J. Lermusiaux</i> | |

| | |
|---|------|
| Measurements of Harbor Features and Underwater Acoustic Data Transmission Performance | 2789 |
| <i>Timothy F. Duda, Peter A. Traykovski, Jennifer J. Johnson, Sandipa Singh, Kevin Manganini, Michael B. Porter</i> | |
| Stochastic Acoustic Ray Tracing with Dynamically Orthogonal Differential Equations | 2799 |
| <i>M. J. Humara, W. H. Ali, A. Charous, M. Bhabra, P. F. J. Lermusiaux</i> | |
| Front-End Circuits for Ultra-High-Frequency Underwater Acoustic Communication Systems | 2809 |
| <i>Fengyi Sun, Xiyuan Zhu, Yukang Xue, Jinfeng Li, Y. Rosa Zheng</i> | |
| Effectiveness of 3D PCD Reconstruction Using Orthogonal Multiple Sonar Fusion on Frame and Surface Type Objects | 2816 |
| <i>Nicholas Sadjoli, Cai Yiyu, Gerald Seet Gim Lee, Basman Elhadidi</i> | |
| Modeling of Tsunami Waves in the Southern Strait of Georgia Generated by a Potential Subaerial Landslide | 2822 |
| <i>Fatemeh Nemati, Lucinda Leonard, Richard Thomson, Gwyn Lintern</i> | |
| Acoustic Passive BEDD Self-Localization for a Fleet of AUVs: A Sea Experiment Validation | 2827 |
| <i>Yuki Sekimori, Yang Weng, Takumi Matsuda, Yukiyasu Noguchi, Chihaya Kawamura, Toshihiro Maki</i> | |
| Marine Trash Collection: A Multi-Agent, Multi-Target Search..... | 2835 |
| <i>Pamela Wang, Malika Meghjani, Gong Chen</i> | |
| Resilient Underwater Acoustic Communications in the Presence of Interference and Jamming | 2842 |
| <i>Daniel J. Jakubisin, Zachary Schutz, Bradley Davis</i> | |
| Passive Pre-Tensioning of Buoyancy Engines for Fail-Safe and Energy Efficient Depth Control..... | 2847 |
| <i>Harry Redfern, Guy Denton, Miquel Massot-Campos, Blair Thornton</i> | |
| Open-Standard Connectivity Framework for Autonomous Vehicles..... | 2854 |
| <i>Matthew Cuomo</i> | |
| ICESat-2 ATL12 Ocean Surface Height and ATL19 Gridded Dynamic Ocean Topography..... | 2858 |
| <i>James Morison, Suzanne Dickinson, David Hancock, John Robbins, Leeanne Roberts</i> | |
| Electromagnetic Under-The-Ice Localization and Communication | 2864 |
| <i>Hiroshi Yoshida, Tatsuro Yonekura, Masaharu Takahashi, Nozomu Ishii, Qiang Chen, Ryotaro Suga</i> | |
| Adaptive Neuro Fuzzy PID Controller for a Compact Autonomous Underwater Vehicle | 2870 |
| <i>Avilash Sahoo, Santosha K. Dwivedy, P. S. Robi</i> | |
| Evaluating Integration of Autonomous Underwater Vehicles into Port Protection | 2875 |
| <i>Brendan P. McNelly, Louis L. Whitcomb, Joseph P. Brusseau, Stephen S. Carr</i> | |
| Dynamics of Aquatic Plants Interacting with Waves..... | 2883 |
| <i>Kamlesh Kumar, Deepu Prabhakaran</i> | |
| 3rd-order Cumulants-Based DOA Estimation in the Presence of Colored Gaussian Noise..... | 2893 |
| <i>Umesh Sharma, Monika Agrawal</i> | |
| A Classical Computer Vision Pipeline for Underwater Detection of Long, Flexible, and Highly Deformable Curvilinear Objects..... | 2897 |
| <i>Nayan Man Singh Pradhan, Francesco Maurelli</i> | |

Real-Time, Low-Cost Proxy Observations of Ocean Rainfall from a Distributed Buoy Network..... 2902
Galen Egan, Ciara Dorsay, Alvaro Prieto, Tosca Lichtenheld, Pieter Smit

Submarine Cables as Precursors of Persistent Systems for Large Scale Oceans Monitoring and
Autonomous Underwater Vehicles Operation 2906

*Marcos Tieppo, Eduardo Pereira, Laura González Garcia, Margarida Rolim, Emanuel
Castanho, Anibal Matos, António Silva, Bruno Ferreira, Maria Pascoal, Eduardo Almeida,
Filipe Costa, Fred Zabel, Joao Faria, José Azevedo, José Alves, Jose Moutinho, Luís
Gonçalves, Marcos Martins, Nuno Cruz, Nuno Abreu, Pedro Silva, Rúben Viegas, Sérgio
Jesus, Tânia Chen, Tiago Miranda, Alan Papalia, Douglas Hart, John Leonard, Maha Haji,
Olivier De Weck, Peter Godart, Pierre Lermusiaux*

Author Index