# Table of Contents

- Model-Based Calculations In Support Of Inverse-Acoustic Sensing Of The Ocean ................................................. 1  
  Paul Etter

- External Pressure Housings .................................................................................. 7  
  Jerry Stachiw

- Underwater Observatories With Panoramic Visibility ...................................... 14  
  J. L. Stachiw and J.D. Stachiw

- Assessing Laboratory and Field Measurements For Design .............................. 20  
  John Niedzwecki

- Orientation Diversity For An Autonomous Underwater Vehicle Cluster .......... 25  
  Samuel Smith and Jeffery Krolik

- A Self Contained Acoustic Recorder For Observations From AUV's ................. 31  
  Paul D. Fucile, Robin C. Singer, Mark Baumgartner and Keenan Ball

- Cooperative Target Tracking In A Distributed Autonomous Sensor Network ... 35  
  Donald Eickstedt and Michael R. Benjamin

- The Mitigation Of Curved By Water Flow Cable Vibrations With A Fairing Element .................................................. 41  
  Moisey Gulman

- Herring and Oil Don't Mix: A Lesson From The Exxon Valdez Oil Spill .......... 45  
  Richard Thorne and Gary L. Thomas

- Alternative Seafood Waste Disposal Procedures For Alaskan Waters ............ 49  
  Richard Thorne, G.L. Thomas and M.A. Bishop

- Interdisciplinary Aspects Of Cost-Risk Tradeoffs ............................................ 53  
  Peter Marshall

- Characterization and Modeling Of Underwater Acoustic Communications Channels For Frequency-Shift-Keying Signals .................................................. 59  
  Wen-Bin Yang and T.C. Yang

- Forming First- and Second-Order Cardioids With Multimode Hydrophones ...... 65  
  James McConnell, Scott C. Jensen and Jason P. Rudzinsky

- Bootstrapped K-Distribution Parameter Estimation ........................................... 71  
  Douglas Abraham and Anthony P. Lyons

- Statistical Behavior Of Echoes From Swimbladder-Bearing Fish At 2-4 Khz .... 77  
  Timothy Stanton, Dezhang Chu, J. Michael Jech, and James D. Irish

- Multi-Scale MAP Denoising Of SAR Images ...................................................... 80  
  Dorina Isar, Alexandru Isar and André Quinquis

- Interferometric Signal Denoised By Wavelets ................................................ 86  
  Christophe Sintes, Ren Garello and Didier Gueriot

- A Fully Automated Approach For Underwater Mosaicking ............................ 92  
  Alessandro Leone, C. Distanza, A. Mastroliu and G. Indiveri

- On Coastal Ocean Systems, Coupled Model Architectures, Products and Services: Morphing From Observations To Operational Predictions Or From “COOS” To “COOPS” Or Rather To “OPS” .................................................. 98  

- The Physical Causes Of Clutter and Its Suppression Via Sub-Band Processing ... 107  
  Mark K. Prior and Alberto Baldacci

- Roughness Spectra and Acoustic Response From A Diver-Manipulated Sea Floor .................................................................................. 113  
  Kevin B. Briggs, Michael D. Richardson, Kevin L. Williams and Anthony P. Lyons

- Off-Line and Real-Time ML-PDA Track Validation .......................................... 119  
  Wayne Blanding, Peter Willett and Yaakov Bar-Shalom
Table of Contents

Development Of High-Resolution Acoustic Camera Based Real-Time Object Recognition System By Using Autonomous Underwater Vehicles .......................................................... 125
Son-Cheol Yu, Tae-Won Kim, Akira Asada, Scott Weatherwax, Ben Collins and Junku Yuh

Detecting Small Slow-Moving Sonar Targets Using Bottom Reverberation Coherence ......................................................... 131
Jinyun Ren and John S. Bird

Predicting The Creep Lifetime Of HMPE Mooring Rope Applications ............................................................................ 137
M.P. Vlasblom and R.L.M. Bosman

Statistical Characterization Of Very Low Frequency Communication Channels At Ocean Basin-Scales ....................... 147
John L. Spiesberger and Dale Green

Subsumption Architecture For Fluid-Advected Chemical Plume Tracing With Soft Obstacle Avoidance ................. 153
Wei Li and Donald Carter

Force/Flow Measurements On A Low-Speed, Vectored-Thruster Propelled UUV ................................................................. 159
K. D. Von Ellenrieder and L. E. J. Ackermann

The K-Nearest Neighbor Attractor-Based Neural Network and The Optimal Discriminatory Filter Classifier .......... 165
Gerald Dobeck

Deep-Sea Geo-Referenced Video Mosaics .............................................................................................................................. 171
Y. Rshahov, L. Mayer, S. Beaulieu, T. Shank, S.A. Soule and D.J. Fornari

Application Of Computational Fluid Dynamics To Research Vessel Design ................................................................. 177
S. Kumar

Compact Buoy System for Scallop Cultivation Using Sensor Network Technologies ..................................................... 181
Masaaki Wada, Katsumori Hatanaka and Masashi Toda

Numerical Prediction Of Coherent Integration Time At 75 Hz, 0.03 Temporal Resolution At 3250 Km .............................. 187
John Spiesberger

Resistance and Static Yaw Experiments On The Underwater Vehicle “Phoenix”; Modeling and Analysis, Utilizing Statistical Design of Experiments Methodology .............................................. 191
F. Azarsina, C.D. Williams and L.M. Lye

Use Of The Automatic Identification System (AIS) On Autonomous Weather Buoys For Maritime Domain Awareness Applications ............................................................................. 197
P. A. Lessing, B. J. Tetreault, L. J. Bernard and J. N. Chaffin

Comparison Of Volterra and Box-Cox Methodologies For Classification and For The Fusion Of Processing Strings, As Applied To Automated Sea Mine Classification In Shallow Water ......................... 203
Tom Arigides and Manuel Fernández

Ocean Observing System Instrument Network Infrastructure ........................................................................................................... 209
Duane R. Edgington, Daniel Davis, Thomas C. O’Reilly

Gauging The Reliability Of Acoustic Instruments For Fisheries Surveys .................................................................................. 213
Hans Knudsen

Modeling and Interpretation Of Beamforming Gain and Diversity Gain For Underwater Acoustic Communications ................................................................. 219
T.C. Yang

12.75" Synthetic Aperture Sonar, High Resolution and Automatic Target Recognition .............................................................. 224
Anthony Matthews, Thomas C. Montgomery, Daniel A. Cook, John W. Oeschger, and John S. Stroud

Visible Reflectance Spectroscopy On A Buoy-Mounted Aerosol Sampler: Development Of A Sensor For Quantifying The Deposition Of Mineral Dust To The Oceans ............................................ 231
S. N. White, E. Sholkovitz, N. Farr

Laser Raman Spectroscopy As A Tool For In Situ Mineralogical Analyses On The Seafloor ................................................. 237
Sheri White

Localization Of Radiating Sources Along The Hull Of A Submarine Using A Vector Sensor Array .................................. 243
Joseph A. Clark and Gerald Tarasek
Table of Contents

Micro Autonomous Underwater Vehicle Concept For Distributed Data Collection ................................................. 246
   Daniel Walker

Near-Real-Time Global Sea Ice Concentration From Spaceborne Passive Microwave Sensors ................................. 250
   Siri Jodha Singh Khalsa and Walter N. Meier

Development and Experimentation Of A Satellite Buoy Network For Real-Time Acoustic Localisation Of Whales In The St. Lawrence .................................................................................................... 253

Shipping Noise and Whales: World Tallest Ocean Liner Vs Largest Animal On Earth .................................................. 259
   Y. Simard, N. Roy and C. Gervaise

Evaluation Of The NOAA Real Time Ocean Forecast System_Atlantic For Operational Use At The NOAA Ocean Prediction Center .................................................................................................................. 265
   Robert Daniels

Are All Floating Structures Vessels?: An Analysis Of The U.S. Supreme Court's Holding In Stewart v. Dutra Construction Company ............................................................................................................ 269
   Stephanie Showalter

Method For Large Sonar Calibration and Backscattering Strength Estimation ............................................................ 273
   Pawel Pociwardowski

Low Complexity OFDM Detector For Underwater Acoustic Channels .................................................................... 278
   Milica Stojanovic

Seafloor Stability Monitoring By Displacements Calculated From Acceleration Waveforms Obtained By A 3-Component Servo-Accelerometer System ................................................................. 284
   H. Saito, T. Yokoyama, and S. Uchiyama

Underwater Communication Link With Iterative Equalisation .................................................................................. 290
   Tommy Öberg, Bernt Nilsson, Niten Olofsson, Magnus Lundberg Nordenvaad, and Erland Sangfelt

Iterative Reception For Acoustic Underwater MIMO Communications ....................................................................... 296
   Magnus Lundberg Nordenvaad and Tommy Öberg

NOAA's AUV Vision: Status and Opportunities .................................................................................................... 302
   Justin Manley

Factor Analysis For Ocean Seismic Remote Sensing .................................................................................................. 307
   Zhenhai Wang

Estimating The Density Of Blainville's Beaked Whale (Mesoplodon Densirostris) In The Tongue Of The Ocean (TOTO) Using Passive Acoustics ................................................................. 313
   D. Moretti, N. Dimarzio, R. Morrissey, J. Ward, S. Jarvis

High Spatial-Resolution Monitoring Of Surface CO2 Concentrations In Lake Michigan .......................................... 318
   J. Zagorski and H. Bootsma

Experiments For Multibeam Backscatter Adjustments On The NOAA Ship Fairweather ....................................... 323
   Luciano Fonseca, Brian Calder, Mark Wetzler

The Application Sea Level Pressure and Vorticity Fields Derived From The University Of Washington Planetary Boundary Layer Model In The NOAA Ocean Prediction Center .................................................... 327
   Joan M. Von Ahn, Joseph M. Sienkiewicz and Gregory M. Mcfadden

Ocean Surface Winds From Space - A Collaborative Education Effort ................................................................. 333
   Joan M. Von Ahn, Zorana Jelenak, Joseph M. Sienkiewicz, and Michael J. Brennan

Assessment Of An Active Electromagnetic Sensor For Hunting Buried Naval Mines, Part II ..................................... 339
   P.J. Carroll, W.M. Wynn, and J.W. Purpura

Model Based Classification Using Multi-Ping Data .................................................................................................. 347
   Christopher P. Carbone and Steven M. Kay

Size Spectrum Of Suspended Particulate Matter In The Bohai Sea ........................................................................... 353
   Zhipeng Sun and Wensheng Jiang
# Table of Contents

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Educational Benefits Of The Human-Powered International Submarine Races</td>
<td>360</td>
</tr>
<tr>
<td>Nancy Hussey and Claude Brancart</td>
<td></td>
</tr>
<tr>
<td>Passive Compensator Load Variation For Deep Water Contact Operations</td>
<td>366</td>
</tr>
<tr>
<td>J.T. Hatleskog and M.W. Dunnigan</td>
<td></td>
</tr>
<tr>
<td>Channel Coding For Underwater Acoustic Communication System</td>
<td>372</td>
</tr>
<tr>
<td>Andre Goalic, Joel Trubuil and Nicolas Beuzelin</td>
<td></td>
</tr>
<tr>
<td>Demonstration Of The Real-Time Tracking Gradiometer For Buried Minehunting While Operating From A Small Unmanned Underwater Vehicle</td>
<td>376</td>
</tr>
<tr>
<td>G. Sulzberger, J. Bono, G.I. Allen, T. Clem, S. Kumar</td>
<td></td>
</tr>
<tr>
<td>The Liverpool Bay Coastal Observatory - Towards The Goals</td>
<td>381</td>
</tr>
<tr>
<td>M.J. Howarth, R. Proctor, P.J. Knight, M.J. Smithson and D.K. Mills</td>
<td></td>
</tr>
<tr>
<td>Heave Compensation Simulation For Non-Contact Operations In Deep Water</td>
<td>387</td>
</tr>
<tr>
<td>J.T. Hatleskog and M.W. Dunnigan</td>
<td></td>
</tr>
<tr>
<td>A Model For Simulation Of A Pulsed Laser Line Scan System</td>
<td>393</td>
</tr>
<tr>
<td>Joseph J. Shirron and Thomas E. Giddings</td>
<td></td>
</tr>
<tr>
<td>Development Of A Towed Survey System For Deployment By The Fishing Industry</td>
<td>399</td>
</tr>
<tr>
<td>Jonathan Howland, Scott Gallager, Hanumant Singh, Andrew Girard, Lane Abrams and Chris Griner</td>
<td></td>
</tr>
<tr>
<td>The Bermuda Testbed Mooring and HALE-ALOHA Mooring Programs: Innovative Deep-Sea Global Observatories</td>
<td>404</td>
</tr>
<tr>
<td>Tommy Dickey, Grace Chang, Casey Moore, Al Hanson, Dave Karl, Derek Manov, Frank Spada, Don Peters, John Kemp, Oscar Schofield and Scott Glenn</td>
<td></td>
</tr>
<tr>
<td>Development Of A Self Triggering Submarine Canyon Event Detector</td>
<td>408</td>
</tr>
<tr>
<td>Larry E. Bird, Brett Hobson, Charles Paull, William Ussler</td>
<td></td>
</tr>
<tr>
<td>High-Resolution Multibeam and Subbottom Surveys Of Submarine Canyons and Gas Seeps Using The MBARI Mapping AUV</td>
<td>414</td>
</tr>
<tr>
<td>Richard Henthorn, David W. Caress, Hans Thomas, Rob McEwen, W. J. Kirkwood, C. K. Paul and Rendy Keaten</td>
<td></td>
</tr>
<tr>
<td>Construction Of Video Mosaics Using The Minimum Description Length</td>
<td>420</td>
</tr>
<tr>
<td>Maria-Joao Rendas</td>
<td></td>
</tr>
<tr>
<td>LAPIS: A New Imaging Tool For Macrozooplankton</td>
<td>426</td>
</tr>
<tr>
<td>L. Madin, E. Horgan, S. Gallager, J. Eaton and A. Girard</td>
<td></td>
</tr>
<tr>
<td>Establishing A Benthic Cabled Observatory With ROV Based Cable Deployment</td>
<td>431</td>
</tr>
<tr>
<td>Larry E. Bird, Dale Graves, Gene Massion, Mark Chaffey, Andrew Hamilton, Rendy Keaten</td>
<td></td>
</tr>
<tr>
<td>An Onboard Air Conveyor Oil Skimmer</td>
<td>437</td>
</tr>
<tr>
<td>Isamu Fujita and Muneo Yoshie</td>
<td></td>
</tr>
<tr>
<td>Seismic Shape Parameters Estimation and Ground-Roll Suppression Using Vector-Sensor Beamforming</td>
<td>443</td>
</tr>
<tr>
<td>Daniela Denon, Umberto Spagnolini and Arne Nehorai</td>
<td></td>
</tr>
<tr>
<td>Dissolved Methane Sensor For Methane Leakage Monitoring In Methane Hydrate Production</td>
<td>449</td>
</tr>
<tr>
<td>T. Fukasawa, S. Hozumi, M. Morita, T. Oketani and M. Masson</td>
<td></td>
</tr>
<tr>
<td>A Comparison Of Outlier Detection Algorithms For Hydro-Acoustic Positioning</td>
<td>455</td>
</tr>
<tr>
<td>Kjell Magne Fauske and Oddvar Hallingstad</td>
<td></td>
</tr>
<tr>
<td>Target-Referenced Localization Of An Underwater Vehicle Using A Laser-Based Vision System</td>
<td>461</td>
</tr>
<tr>
<td>George C. Karras, Dimitra J. Panagou and Kostas J. Kyriakopoulos</td>
<td></td>
</tr>
<tr>
<td>Robust Broadband Adaptive Beamforming Via Polynomial Eigenvalues</td>
<td>467</td>
</tr>
<tr>
<td>Soydan Redif, John G. Mcwhirter, Paul D. Baxter and Thomas Cooper</td>
<td></td>
</tr>
<tr>
<td>Status Report On Predicted Current Measuring Capabilities Of The Upcoming German Satellite Terrasar-X</td>
<td>473</td>
</tr>
<tr>
<td>Roland Romeiser and Hartmut Rungel</td>
<td></td>
</tr>
</tbody>
</table>
# Table of Contents

Unambiguous Triplet Array Beamforming and Calibration Algorithms To Facilitate An Environmentally Adaptive Active Sonar Concept.........................................................479
Georgios Haralabus and Alberto Baldacci

A Chorus Of Whales: Evaluation Of Sequential and Batch Approaches To Time-Series Tracking.........................485
Odile Gerard, Stefano Coraluppi, Walter Zimmer and Peter Willett

Underwater Acoustic Communications With Multi-Carrier Modulation..........................................................491
Andrey K. Morozov and James C. Preisig

Cross-Spectral Phase Method For Distinguishing Waves From Turbulence In Single-Point Boundary Layer Flow Measurements........................................................................497
Weichang Li and Albert J. Williams

High-Fidelity Model For Sonar Interrogation Of Bottom and Surface Targets In Shallow Water..........................503
Thomas E. Giddings and Joseph J. Shirron

Acoustic Behavior Of Beaked Whales, With Implications For Acoustic Monitoring...........................................509
Peter L. Tyack, Mark P. Johnson, Walter M.X. Zimmer, Natacha Aguilar De Soto and Peter T. Madsen

A Kernel Machine Framework For Feature Optimization In Multi-Frequency Sonar Imagery..............................515
J.R. Stack, R. Arrieta, X. Liao and L. Carin

On The Use Of The Stochastic Matched Filter For Ship Wake Detection In SAR Images..................................521
Fabien Chaillan and Philippe Courmontagne

Development Of An Integrated Acoustical-Optical Platform For Detecting Groundfish..................................527
Jiaming Zhang, Zhenhai Wang, Ernest Bernard, Christopher J. Jakubiak, Jennifer L. Miksis-Olds

Automated Classification Of Beaked Whales and Other Small Odontocetes In The Tongue Of The Ocean, Bahamas.................................................................532
Susan Jarvis, Nancy Dimarzio, Ronald Morrissey and David Morretti

The Adative Stochastic Matched Filter For SAS Images De-Noising...............................................................538
Philippe Courmontagne, Fabien Chaillan,

Calibration Of A Steered Phased-Array Sonar For Use In Fish Detection.......................................................544
Ernest Bernard, Christopher J. Jakubiak, Jennifer L. Miksis-Olds, John Penvenne and D.V. Holliday

Design and Implementation Of A Regional Association For The Gulf Of Mexico Coastal Ocean Observing System........................................................................549
Ann Jochens

Auvis: An Application-Based Language For Cooperating Auvs.........................................................................553
Andrew Rajala, Michael O’Rourke, Dean B. Edwards

Technology Refresh Of NOAA’S Tropical Atmosphere-Ocean (TAO) Buoy System........................................559
Chung-Chu Teng, Landry J. Bernard, Pete A. Lessing

Coil-Cord Conductors On Compliant Elastic Moorings..................................................................................565
James Irish, Stanley J. Boduch and Walter Paul

Solid State Attitude Sensor For Low Cost Marine Application........................................................................571
Jon Crowell

Aquaculture Feed Buoy Control - Part 1: System Controller .............................................................................575
Stanley Boduch and James D. Irish

Aquaculture Feed Buoy Control - Part 2: Telemetry, Data Handling and Shore-Based Control........................581
James Irish and Stanley J. Boduch

Evaluation Of Laser Induced Breakdown Spectroscopy (LIBS) As A New In Situ Chemical Sensing Technique For The Deep Ocean.........................................................587
Anna P. M. Michel, Norman E. Farr, and Alan D. Chave

Engineering Overview Of The University Of New Hampshire’s Open Ocean Aquaculture Project..................592
Barbaros Celikkol, Judson Decew, Kenneth Baldwin, Stanley Boduch, Michael Chambers, David W. Fredriksson, Jim Irish, Oystein Patursson, Glen Rice, M. Robinson Swift, Igor Tsukrov, Chad A. Turmelle