

Carlos A. Michelén Ströfer

GRADUATE STUDENT · VIRGINIA TECH

Blacksburg, Virginia, USA

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Education

Virginia Polytechnic Institute and State University

Ph.D. AEROSPACE ENGINEERING

- Ocean Engineering Track
- Advisor: Dr. Heng Xiao

Blacksburg, VA

August 2016 - PRESENT

University of Michigan

M.S.E. NAVAL ARCHITECTURE AND MARINE ENGINEERING

Ann Arbor, MI

April 2013

University of Michigan

B.S.E. NAVAL ARCHITECTURE AND MARINE ENGINEERING

- Minor in Oceanography
- Minor in International Engineering

Ann Arbor, MI

April 2012

Experience

RESEARCH EXPERIENCE

Virginia Tech

GRADUATE STUDENT

- Ph.D. research on using experimental data to supplement fluid dynamics simulations.
- Used convolutional neural networks for automatic detection of structures in flow fields.
- Used data assimilation techniques to improve predictions in RANS simulations through improvement of predicted Reynolds stress field.

Blacksburg, VA

August 2016 - Present

Sandia National Laboratories

RESEARCHER

- Full-time employee working on marine renewable energy.
- Part of the team that developed the open-source wave energy converter (WEC) simulation code, WEC-Sim.
- Participated in the planning and execution of experimental testing of a WEC device for code validation.
- Developed a methodology for studying extreme response of WEC devices using statistical methods.

Albuquerque, NM

May 2013 - July 2016

VIVACE - Vortex Induced Vibrations for Aquatic Clean Energy, University of Michigan

RESEARCH ASSISTANT

- Performed simulations of cylinders and similar geometries under vortex induced vibrations using OpenFOAM in order to identify the potential of new designs for energy harvesting.
- Performed simulations of cylinders with turbulence stimulation and compared results to experimental data.

Ann Arbor, MI

September 2012 - April 2013

SEA Semester, Sea Education Association

STUDENT, SUMMER OCEAN EXPLORATION PROGRAM

- Sailed successfully a tall ship from HI to CA, with my shipmates, using traditional methods of navigation.
- Performed various oceanographic sampling and data collection routinely as part of the laboratory staff.
- Designed and conducted a research project on the biogeographical distribution of Lanternfish.

Woods Hole, MA

June 2010 - July 2010

Target Fabrication for Laboratory Astrophysics Experiments, University of Michigan

Ann Arbor, MI

RESEARCH ASSISTANT, UNDERGRADUATE RESEARCH OPPORTUNITY PROGRAM

September 2007 - April 2008

- Constructed supernova-simulating targets for use in high density physics experiments.
- Constructed millimeter-scale components using microscopes and computerized positioning stages.

TEACHING AND MENTORING EXPERIENCE

Virginia Tech

Blacksburg, VA

GRADUATE TEACHING ASSISTANT

August 2016 - Present

- Developed course content, taught, graded assignments, and interacted with students for undergraduate aerospace and ocean engineering courses, including wave mechanics, introduction to ocean engineering, aerospace engineering lab, and ocean engineering lab.

STEM UP - University of New Mexico

Albuquerque, NM

PROFESSIONAL MENTOR

September 2015 - May 2016

- Participated in the UNM STEM UP program as a professional mentor.
- The program helps minority students in STEM fields succeed in their first year in college.

The Young's People's Project

Ann Arbor, MI

COLLEGE MATH LITERACY WORKER, PAID POSITION

August 2011 - April 2012

- Facilitated an after school program, where I taught cryptography to 16 high school students.
- The program promotes social justice through math literacy.

PROFESSIONAL EXPERIENCE

Hyundai Heavy Industries

Ulsan, South Korea

PARTICIPANT, SHIPBUILDING TRAINING PROGRAM

June 2012 - July 2012

- Experienced the shipbuilding process through a series of lectures, tours and hands-on activities.
- Rotated through R&D, Shipbuilding, and Engine and Propeller Manufacturing departments.

Indústria Naval do Ceará S.A.

Fortaleza, CE, Brazil

SUMMER INTERN

May 2011 - August 2011

- Determined if the preliminary structural design of a river hydrographic vessel, designed by Brazilian navy rules, satisfied ABS regulations, and gave recommendations accordingly.
- Assisted with inclination test, sea trials and ABS communications for an offshore fast supply vessel.
- Translated the official contract delivery drawings of a Patrol Vessel for the Namibian Navy.

CIRAMAR Shipyards, International Trading Co., Ltd.

Calderas, Dominican Republic

SUMMER INTERN

July 2008 - August 2008

- Measured the thickness of ships' plates and structural elements at thousands of points to determine the locations where repair was needed, and assisted with the 'Steel Report'.

Skills

Computer Skills, Proficient with Linux OS, high performance computing (HPC) and parallel computing. Programming languages: Python, Matlab, and SimuLink. Software: OpenFOAM, StarCCM+, Rhino, Git, Latex.

Languages, Spanish (fluent), French (intermediate), Portuguese (intermediate).

Honors & Awards

2017	Recipient , Kevin T. Crofton Graduate Fellowship - Virginia Tech	Blacksburg, VA
2015	1st Place , ASME OMAE - COER Hydrodynamic Modeling Competition	St. John's, Canada
2014	Recipient , Sandia National Laboratories - Certificate of Excellence	Albuquerque, NM
2013	Recipient , Scholar Power - Master's Student Achievement Award	Ann Arbor, MI
2012	Recipient , Harry Benford NA&ME Loyal Crew Award - University of Michigan	Ann Arbor, MI

Professional Memberships

Society of Naval Architects and Marine Engineers, 2008 - 2012, 2016 - Present
International Network on Offshore Renewable Energy (INORE), 2016-Present
Society of Hispanic Professional Engineers - SHPE, September 2007 - May 2012
Alumni Chair, September 2011 – April 2012
Community Service Chair, September 2010 – April 2011
Social Chair, September 2008 – April 2009

Presentations

WEC-Sim Training Workshops

INSTRUCTOR/PRESENTER

2015 - 2016

- Taught several hands-on training on using the WEC-Sim code for modeling wave energy converters.
- DOE Marine Energy Technology Symposium, 1 hour presentation, Washington D.C., April 2016
- Oregon State University, 2 day workshop, Corvallis, OR, March 2016
- International Network on Offshore Renewable Energy (INORE) North American Symposium, 2 hour workshop, Friday Harbor, WA, October 2015

Publications

Journal Articles

- [1] Ryan G. Coe et al. "Full Long-Term Design Response Analysis of a Wave Energy Converter". In: *Renewable Energy* 116 (Feb. 2018), pp. 356–366.
- [2] Carlos Michelén Ströfer et al. "Data-Driven, Physics-Based Feature Extraction from Fluid Flow Fields". In: *arXiv:1802.00775 [physics]* (2018). arXiv: 1802.00775 [physics].
- [3] Ratanak So et al. "Statistical Analysis of a 1:7 Scale Field Test Wave Energy Converter Using WEC-Sim". In: *IEEE Transactions on Sustainable Energy* 8.3 (Jan. 2017), pp. 1118–1126.

Conference Proceedings

- [4] Ryan G. Coe et al. "WDRT: A Toolbox for Design-Response Analysis of Wave Energy Converters". In: *Proceedings of the 4th Marine Energy Technology Symposium*. Washington D.C., USA, Apr. 2016.
- [5] Lance Manuel et al. "On the Short-Term Uncertainty in Performance of a Point Absorber Wave Energy Converter". In: *Proceedings of the 4th Marine Energy Technology Symposium*. Washington D.C., USA, Apr. 2016.
- [6] Carlos Michelen et al. "Tool for Distributed Pressure Time-Histories of Marine Structures: Verification and Case Study with a WEC". In: *Proceedings of the 4th Marine Energy Technology Symposium*. Washington D.C., USA, Apr. 2016.
- [7] Kelley Ruehl et al. "Update on WEC-Sim Validation Testing and Code Development". In: *Proceedings of the 4th Marine Energy Technology Symposium*. Washington D.C., USA, Apr. 2016.

- [8] Kelley Ruehl et al. “WEC-SIM Phase 1 Validation Testing – Numerical Modeling of Experiments”. In: *Proceedings of the ASME 2016 35th International Conference on Ocean, Offshore and Arctic Engineering, OMAE2016*. Vol. Volume 6: Ocean Space Utilization; Ocean Renewable Energy. Busan, South Korea: ASME, June 2016.
- [9] Michael Lawson et al. “COER Hydrodynamic Modeling Competition: Modeling the Dynamic Response of a Floating Body Using the WEC-SIM and FAST Simulation Tools”. In: *Proceedings of the 34th International Conference on Ocean, Offshore and Arctic Engineering*. St. John’s, New Foundland, Canada: ASME, 2015.
- [10] Carlos Michelen and Ryan Coe. “Comparison of Methods for Estimating Short-Term Extreme Response of Wave Energy Converters”. In: *OCEANS’15 MTS/IEEE Washington*. Washington, DC, USA: IEEE, Oct. 2015.
- [11] Kelley Ruehl et al. “Improving and Validating the WEC-Sim Wave Energy Converter Modeling Code”. In: *Proceedings of the 3rd Marine Energy Technology Symposium*. Washington D.C., USA, Apr. 2015.
- [12] Asher Simmons et al. “Creating a Dynamometer for Experimental Validation of Power Take-off Forces on a Wave Energy Converter”. In: *2015 IEEE Conference on Technologies for Sustainability (SusTech)*. Ogden, UT, USA: IEEE, July 2015, pp. 148–153.
- [13] Ratanak So et al. “Development of PTO-Sim: A Power Performance Module for the Open-Source Wave Energy Converter Code WEC-Sim”. In: *Proceedings of the ASME 2015 34th International Conference on Ocean, Offshore and Arctic Engineering*. Vol. Volume 9: Ocean Renewable Energy. St. John’s, Newfoundland, Canada: ASME, May 2015.
- [14] Budi Gunawan et al. “Model Validation Using Experimental Measurements from the Garfield Thomas Water Tunnel at the Applied Research Laboratory (ARL) at Penn State University”. In: *Proceedings of the 2nd Marine Energy Technology Symposium*. Seattle, Washington, USA, Apr. 2014.
- [15] Michael Lawson et al. “Implementing Nonlinear Buoyancy and Excitation Forces in the WEC-Sim Wave Energy Converter Modeling Tool”. In: *Proceedings of the 33rd International Conference on Ocean, Offshore and Arctic Engineering*. Vol. Volume 9B: Ocean Renewable Energy. San Francisco, California, USA: ASME, June 2014.
- [16] Carlos Michelen et al. “Cactus Open Source Code for Hydrokinetic Turbine Design and Analysis: Model Performance Evaluation and Public Dissemination as Open Source Design Tool”. In: *Proceedings of the 2nd Marine Energy Technology Symposium*. Seattle, Washington, USA, Apr. 2014.
- [17] Kelley Ruehl et al. “Preliminary Verification and Validation of WEC-Sim, an Open-Source Wave Energy Converter Design Tool”. In: *Proceedings of the ASME 2014 33rd International Conference on Ocean, Offshore and Arctic Engineering*. Vol. Volume 9B: Ocean Renewable Energy. San Francisco, California, USA: ASME, June 2014.
- [18] Y. Yu et al. “Development and Demonstration of the WEC-Sim Wave Energy Converter Simulation Tool”. In: *Proceedings of the 2nd Marine Energy Technology Symposium*. Seattle, Washington, USA, Apr. 2014.
- [19] Vincent Sinclair Neary et al. “US Department of Energy (DOE) National Lab Activities in Marine Hydrokinetics: Scaled Model Testing of DOE Reference Turbines.” In: *Proceedings of the 10th European Wave and Tidal Energy Conference*. Aalborg, Denmark, Sept. 2013.