

PABLO M. CARRICA

(ph 319-335-6381, fax 319-335-5238, pablo-carrica@uiowa.edu)
September 26, 2018

Education

Nuclear Engineer (1990). Doctor in Nuclear Engineering (1993). Instituto Balseiro, Argentina.

Positions Held

Professor (promoted 2014), Department of Mechanical Engineering (ME), University of Iowa. 2002 – *Present*.
Research Engineer, Iowa Institute of Hydraulic Research, University of Iowa. 2002 – *Present*.

Research Interests

Naval Hydrodynamics, Bubbly Flows, Ship Aerodynamics, Computational Fluid Dynamics.

Scientific and Professional Societies

Member of ASME, ASEE and SNAME.

SERVICE

National and International: Associate Editor, Journal of Marine Science and Technology (official journal of the Japan SNAOE, since 2006), Associate Editor, Journal of Ship Research (SNAME, since 2018), Member of ITTC Specialist Committee for CFD in Ship Hydrodynamics (2008-2011 and 2012-2014 as secretary), Member of NATO AVT-303 Incompressible Laminar-to-Turbulent Flow Transition Study (since 2017). Reviewer for PRACE (Partnership for Advanced Computing in Europe, 2015-2017), Netherlands Organisation for Scientific Research (2013), NSF, Research Council of Norway (2015), German Research Foundation (2018).

Department, College, University: Chairman of the MIE Department Consulting Group (since 2015), member of the CoE Undergraduate Committee (2009-2011, chairman in 2011), Chairman of the ME Lecturer Search Committee (2014-2015, 2017), Member of the Mechanical Engineering Undergraduate Committee (September 2009-2014, September 2014-2015 as Chairman), Member of the Wind Energy Faculty search committee (2011). Faculty advisor for ASME student chapter (September 2008-September 2009), SAE student chapter (September 2009-2015), Society of Hispanic Prof. Engineers (SHPE) student chapter (September 2009-December 2011) and AWEA student chapter (September 2011-present).

TEACHING

Courses taught at The University of Iowa, ME Department

Thermal area: Intermediate Heat Transfer (2002, 2003), Heat Transfer (2006), Thermodynamics II (2003, 2006, 2007), Intermediate Thermodynamics (2003).

Fluid Mechanics area: Intermediate Mechanics of Fluids (2003, 2011), Environmental Fluid Mechanics (2003), Two-Phase Flow Modeling (2009), Computational Ship Hydrodynamics (2010, 2012), Wind Turbine Aerodynamics (2013, 2014, 2015, 2016, 2017, 2018), Computational Naval Hydrodynamics (2016, 2018).

Other courses: Experimental Engineering (14 times between 2007 and 2016)

GRADUATE STUDENT SUPERVISION

PhD level:

1. Cagri Turan (Spring 2007), “Numerical simulation of water entrainment due to spillway surface jets” (co-advisor L. Weber)
2. Nobuaki Sakamoto (Spring 2009) “URANS and DES Simulations of Static and Dynamic Maneuvering for Surface Combatant” (co-advisor F. Stern)
3. Hamid Hosseini (Fall 2009) “CFD Prediction of Ship Capsize: Parametric Rolling, Broaching, Surf-Riding and Periodic Motions” (co-advisor F. Stern)
4. M. Mousaviraad (Spring 2010) “CFD Prediction of Ship Response to Extreme Winds and/or Waves” (co-advisor F. Stern)
5. Kwang-Jun Paik (Spring 2010) “Simulation of Fluid-Structure Interaction for Surface Ships with Linear/Nonlinear Deformations”
6. Alejandro Castro (Fall 2011) “Polydisperse Bubbly Flow Model for Ship Hydrodynamics with Application to Athena R/V”
7. Yuwei Li (Spring 2014) “Fluid-Structure Interaction and Loads on Wind Turbines”
8. Jiajia Li (Summer 2015) “Modeling Bubble Entrainment and Validation”
9. Matias Perret (Summer 2016) “Bubble measurements in a flat-bottom boat”
10. Mehdi Esmailpour (Spring 2017) “Density Waves and the Dead Water Problem”
11. Alireza Mofidi (Summer 2017) “Self-Propulsion and Maneuvering of a Ship with Modeled and Discretized Propeller”
12. Yagin Kim (in progress) “Submarine Maneuvering Near the Surface”
13. Mehedi Bappy (in progress) “Cavitation Modeling”
14. Dongyoung Kim (in progress) “Boundary Layer Transition Modeling”
15. Ben Yuan (in progress) “RANS/LES modeling for Bubble Entrainment”

MS level (with thesis):

1. Shae Hoschek (Spring 2005) “Phase Detection Probe Development and Application to Air Entrainment in a Laboratory Model Spillway” (co-advisor L. Weber)
2. Brady McDaniel (Spring 2006) “A Model Study of Brownlee Dam Tailrace Flow” (co-advisor L. Weber)
3. James Johansen (Spring 2010) “Full-Scale Two-Phase Flow Measurements Using Optical Probes on Athena II Research Vessel”
4. Nathan Chase (Spring 2012) “Simulations of the DARPA Suboff submarine including self-propulsion with the E1619 propeller”
5. Michael Carbone (Spring 2013) “Numerical Evaluation of Deflector Performance in the Tailrace of Hells Canyon Dam” (co-advisor M. Politano)
6. Joe Dvorak (Spring 2013) “CFD Modeling for Reduction of Fish Exposure to Elevated TDG and Predators at McNary Dam” co-advisor M. Politano)
7. Matias Perret (Fall 2013) “Experimental Studies in a Two-Phase Surface Jet”
8. Matthew Pontarelli (spring 2017) “Flow Regimes in Propeller Crashback”
9. Greg Dooley (in progress) “Ship Airwakes with Ship Motions and Atmospheric Boundary Layer”

POSTDOCTORAL ASSOCIATE SUPERVISION

2006-2008 Farzad Ismail (w/ F. Stern), Convection Schemes (currently at Univ. Science Malaysia)
2006-2008 Seang-Keat Ooi (w/ F. Stern), High-Speed Ferry Optimization (currently Delft Lab. Singapore)
2011-2012 Ezequiel Martin, Multiphase Flow Code Development (currently Research Eng. at Univ. of Iowa)
2011-2012 Alejandro Castro, Air Entrainment Modeling (currently at Toyota Research Institute)
2015-2016 Jiajia Li, Air Entrainment Modeling (currently Research Scientist at Univ. of Iowa)
2017-2018 Sudip Adhikari, Coupled CFD/MBD
2018-current Suresh Behara, Coupled CFD/MBD (currently at Univ. of Iowa)

GRANTS AND CONTRACTS

Ending over past 5 years. Previously \$1.369M in contracts and grants as PI ending 2008-2013 from ONR, NSF, ESB, IAWIND, Pacific International Engineering, Amjet, ESB and DoN.

1. P. M. Carrica (PI), H. Sugiyama, E. Martin, "High-Fidelity Coupled CFD/MBD for Vehicle Operation in Very Shallow Water and the Surf Zone," *Office of Naval Research (ONR)*, 2/18-1/21, \$817,787.
2. P. M. Carrica (PI), "Predicting Turbulent Multi-Phase Flows with High Fidelity: A Physics-Based Approach," *ONR*, 8/17-7/22, \$750,000 (Multidisciplinary University Research Initiative, sub-award from University of Minnesota).
3. P. M. Carrica (PI), C. Harwood, E. Martin, "Hydrodynamic Studies for Submersible Amphibious Combat Vehicles," *ONR*, 6/17-5/19, \$433,752.
4. P. M. Carrica (PI), E. Martin, "Hydrodynamics of Operation of Self-Propelled Submarines in Waves," *ONR*, 3/17-2/20, \$315,001.
5. P. M. Carrica (PI), J. Li, "Bubble Entrainment and Transport for Hybrid RANS/LES Methods in Naval Hydrodynamics," *ONR*, 1/17-12/19, \$685,370.
6. P. M. Carrica (PI), J. Buchholz, E. Martin, "Effects of Ship Motions and Atmospheric Boundary Layer on Ship Aerodynamics," *ONR*, 6/16-5/19, \$732,655.
7. P. M. Carrica (PI), E. Martin, "ONR Biomimetic Vector Sensor Towed Array for UUVs," *Department of Energy*, 11/16-9/19, \$342,400 (currently suspended).
8. J. Buchholz (PI), P. M. Carrica, "Engaging Undergraduates and High School Students in Naval Science & Technology," *ONR*, 8/15-7/18, \$599,000.
9. P. M. Carrica (PI), "Provision of Bubbly Flow Probes to the Naval Undersea Warfare Center," *Department of the Navy (DoN)*, 8/14-9/14, \$14,700.
10. C. Markfort (PI), M. Politano, E. Martin, P. M. Carrica, "Optimizing Bat Carcass Search Areas Using a CFD-Lagrangian Modeling Approach," *MidAmerican Energy*, 9/15-8/16, \$99,000.
11. P. M. Carrica (PI), E. Martin, "CFD Simulations for US Coast Guard Offshore Patrol Cutter Phase I Preliminary and Contract Design," *Eastern Shipbuilding (ESB)*, 7/14-12/15, \$374,500.
12. P. M. Carrica (PI), E. Martin, "Computational Fluid Dynamics Tools for Surface and Near Surface Operations of Submarine with Propulsor," *ONR*, 1/14-12/16, \$228,534.
13. P. M. Carrica (PI), A. Castro, "Cable Model Implementation for High-Performance Computational Fluid Dynamics of Towed Marine Vehicles," *DoD High Performance Computing Modernization Office*, 3/14-9/14, \$73,621.
14. P. M. Carrica (PI), E. Martin, "Realistic Simulation of a Wind Farm Unit for Energy Production Optimization," *Iowa Energy Center*, 1/14-8/14, \$88,400.

15. P. M. Carrica (PI), A. Castro, “Modeling Bubble Entrainment for CFD Computations of the Near-Field of Bubbly Wakes,” *ONR*, 10/13-09/17, \$743,714.
16. F. Stern (PI), P. M. Carrica, S. Bhushan, J. Yang, “Unsteady 3D Wake Modeling and Prediction,” *ONR*, 6/13-5/16, \$420,000.
17. P. M. Carrica (PI), “Bubble-wall interaction on full-scale boundary layers,” *ONR*, 10/10-9/14, \$459,251.
18. P. M. Carrica (PI), “Integration of PUF-14 into CFDSHIP-Iowa V4.5 and validation for transient self-propulsion and maneuvering applications,” *ONR*, 1/11-12/13, \$182,899.
19. P. M. Carrica (PI), “Air Entrainment Models and CFD Implementation for Marine Applications,” *ONR*, 7/11-6/13, \$539,476.
20. P. M. Carrica (PI), “Collaborative Research: Simulation Based Design for Deep Water Offshore Wind Turbines Including Wave Loads and Motions,” *National Science Foundation (NSF)*, 5/11-4/14, \$101,299.

HIGH PERFORMANCE COMPUTING

DoD High Performance Modernization Program standard awards since 2012, currently 8M CPU hours in 8 computers for FY2019. Navy Pathfinder program high-priority allocation awards since 2015, 2.5 M CPU hours in 5 computers for FY2019.

PUBLICATIONS

Google Scholar citations 3740, h-index 34.

International Journals (Since 2013, total 89 published, 5 submitted and 4 in preparation)

1. J. Li, P. M. Carrica, “An approach to couple velocity/pressure/void fraction in two-phase flows with incompressible liquid and compressible bubbles,” *Int. J. Multiphase Flow* **102**, 77-94 (2018).
2. A. Mofidi, J. E. Martin, P. M. Carrica, “Propeller/Rudder Interaction with Direct and Coupled CFD/Potential Flow Propeller Approaches, and Application to a Zig-Zag Maneuver”, *Ship Technol. Res.* **65**, 10-31 (2018).
3. M. Esmailpour, J. E. Martin, P. M. Carrica, “Computational Fluid Dynamics Study of the Dead Water Problem”, *J. Fluids Eng.* **140**(3), 031203 (2018).
4. Y. Li, A. M. Castro, J. E. Martin, T. Sinokrot, W. Prescott, P. M. Carrica, “Coupled Computational Fluid Dynamics/Multibody Dynamics Method for Wind Turbine Aero-Servo-Elastic Simulation Including Drivetrain Dynamics,” *Ren. Energy* **101**, 1037-1051 (2017).
5. A. M. Castro, J. Li, P. M. Carrica, “A Mechanistic Model of Bubble Entrainment in Turbulent Free Surface Flows,” *Int. J. Multiphase Flow* **86**, 35-55 (2016).
6. M. Esmailpour, J. E. Martin, P. M. Carrica, “Near-Field Flow of Submarines and Ships Advancing in a Stable Stratified Fluid,” *Ocean Eng.* **123**, 75-95 (2016).
7. P. M. Carrica, A. Mofidi, K. Eloit, G. Delefortrie, “Direct Simulation and Experimental Study of Zigzag Maneuver of KCS in Shallow Water,” *Ocean Eng.* **112**, 117-133 (2016).
8. M. Mousaviraad, H. Sadat-Hosseini, P. M. Carrica, F. Stern, “Ship–Ship interactions in calm water and waves. Part 2: URANS validation in replenishment and overtaking conditions,” *Ocean Eng.* **111**, 627-638 (2016).
9. H. Sadat-Hosseini, D.-H. Kim, P. M. Carrica, S. H. Rhee, F. Stern, “URANS Simulations for a Flooded Ship in Calm Water and Regular Beam Waves,” *Ocean Eng.* **120**, 318-330 (2016).

10. Y. Li, J. E. Martin, T. J. Michael, P. M. Carrica, "A Study of Propeller Operation Near a Free Surface," *J. Ship Res.* **59** (4), 1-11 (2015).
11. J. Li, A. M. Castro, P. M. Carrica, "A pressure-velocity coupling approach for high-void fraction free surface bubbly flows," *Int. J. Num. Meth. Fluids* **79**, 343-369 (2015).
12. Z. Shen, D. Wan, P. M. Carrica, "Dynamic Overset Grids in OpenFOAM with Application to KCS Self-Propulsion and Maneuvering," *Ocean Eng.* **108**, 287-306 (2015).
13. J. E. Martin, T. Michael, P. M. Carrica, "Submarine Maneuvers Using Direct Overset Simulation of Appendages and Propeller and Coupled CFD/Potential Flow Propeller Solver," *J. Ship Res.* **59** (1), 31-48 (2015).
14. M. Perret, P. M. Carrica, "Bubble-Wall Interaction and Two-Phase Flow Parameters on a Full-Scale Boat Boundary Layer," *Int. J. Multiphase Flow* **73**, 289-308 (2015).
15. Y. Li, A. M. Castro, T. Sinokrot, W. Prescott, P. M. Carrica, "Coupled CFD/Multibody Dynamics Approach for Wind Turbine Simulations," *Ren. Energy* **76**, 338-361 (2015).
16. A. Mofidi, P. M. Carrica, "Simulations of Zigzag Maneuvers for a Container Ship with Direct Moving Rudder and Propeller," *Comput. Fluids* **96**, 191-203 (2014).
17. K. Paik & P. M. Carrica, "Fluid-Structure Interaction for an Elastic Structure Interacting with Free Surface in a Rolling Tank," *Ocean Eng.* **84**, 201-212 (2014).
18. S. Quallen, T. Xing, P. M. Carrica, Y. Li, J. Xu, "CFD Simulation of a Floating Offshore Wind Turbine System Using a Quasi-Static Crowfoot Mooring-Line Model," *J. Ocean Wind Energy* **1**, 143-152 (2014).
19. S. Quallen, T. Xing, P. M. Carrica, Y. Li, J. Xu, "Discussion: CFD Simulation of a Floating Offshore Wind Turbine System Using a Quasi-Static Crowfoot Mooring-Line Model," *J. Ocean Wind Energy* **1**, 185-188 (2014).
20. N. Chase, B. Choi, P. M. Carrica, "A Boiling Heat Transfer Experiment for Senior Level Engineering Laboratory," *Int. J. Mech. Eng. Educ.* **41**, 212-226 (2013).
21. P. M. Carrica, F. Ismail, M. Hyman, S. Bhushan, F. Stern, "Turn and Zigzag Maneuvers of a Surface Combatant Using a URANS Approach with Dynamic Overset Grids", *J. Marine Sci. Technol.* **18**, 166-181 (2013).
22. A. M. Castro. P. M. Carrica, "Eulerian polydispersed modeling of bubbly flows around ships with application to Athena R/V," *Int. Shipbuilding Progr.* **60**, 403-433 (2013).
23. N. Chase, T. Michael, P. M. Carrica, "Overset simulations of a Submarine in Towed, Self-Propelled and Maneuvering Conditions," *Int. Shipbuilding Progr.* **60**, 171-205 (2013).
24. A. M. Castro, P. M. Carrica, "Bubble Size Distribution Prediction with Multigroup Discretization Approaches," *Int. J. Multiphase Flow* **57**, 131-150 (2013).
25. M. Perret, M. Esmaeilpour, M. S. Politano, P. M. Carrica, "Experimental Study of a Two-Phase Surface Jet," *Exp. Fluids* **54**, 1510 (2013).
26. H. Sadat-Hosseini, P.-C. Wu, P. M. Carrica, H. Kim, Y. Toda, F. Stern, "CFD Simulation and Validation of Added Resistance of KVLCC2 with Fixed and Free Surge Conditions in Short and Long Head Waves," *Ocean Eng.* **59**, 240-273 (2013).
27. N. Chase, P. M. Carrica, "CFD Simulations of a Submarine Propeller and Application to Self-Propulsion of a Submarine," *Ocean Eng.* **60**, 68-80 (2013).

Conferences

Total 115.