Curriculum Vitae

Mark Owkes, Ph.D.
P.O. Box 173800
Bozeman, MT 59717-3800
mark.owkes@montana.edu
406-994-6300

Positions

Assistant Professor, Mechanical Engineering — 2014 - Present
Montana State University — Bozeman, MT

Graduate Research Assistant — 2011 - 2014
Cornell University — Ithaca, NY

Graduate Research Assistant — 2008 - 2011
University of Colorado — Boulder, CO

Research Assistant — 2006 - 2008
Clarkson University — Potsdam, NY

Reliability Engineering Intern — 2006
GE Energy — Schenectady, NY

Intern — 2003 & 2004
Millennium Global Technology, Inc. — Vernon, NY

Education

Ph.D., Mechanical Engineering — 2011 - 2014
Cornell University — Ithaca, NY
· Dissertation: Numerical Methods for Simulating Multiphase Flows with a Focus on Atomization

M.S., Mechanical Engineering — 2008 - 2011
University of Colorado — Boulder, CO
· Focus: Energy and the Environment

B.S., Mechanical Engineering — 2004 - 2008
Clarkson University — Potsdam, NY
· Minor: Mathematics

Research Funding

5. **Fostering Collaborations through Strategic Visits with Experts**
Role PI
Source Center for Faculty Excellence, Montana State University
Date 2017-2018
Amount $4,648

4. **multiphase-UQ: Uncertainty Quantification Framework for Multiphase Flow Simulations**
Role PI
Source National Science Foundation
Date 2015-2018
Amount $276,365

Collaboration for EHD Spray Project and Consulting
Role Consultant
3. Source United States Military Academy
Amount $48,000 (2017-2019)
$69,120 (2015-2017)

Oblique Shock Interaction with Liquid Droplets
Role Subcontractor
2. Source Air Force Research Laboratory
Date 2016-2017
Amount $8,488 - Owkes lab amount

Start-up Funding
Role PI
1. Source Montana State University
Date 2014-2017
Amount $207,000

Teaching Experience

Assistant Professor 2014 - Present
Montana State University Bozeman, MT
- EMEC 436 - Computational Fluid Dynamics (S 2018)
- EGEN 506 - Numerical Solution to Engineering Problems (S 2017, S 2018)
- EMEC 303 - System Analysis. (F 2014, S/F 2015, S/F 2016) Revamped course content to include more numerical methods for engineers to prepare students for current and future employment opportunities
- EMEC 100 - Introduction to Mechanical Engineering (F 2015)

Instructor 2011 - 2012
Art Institute of Colorado Denver, CO
- Taught physics, robotics, and mechanical engineering courses

Teaching Assistant for Fluid Dynamics Laboratory 2012
Cornell University, Dr. Charles Williamson Ithaca, NY

Teaching Assistant for Fluid Dynamics Course 2008
University of Colorado, Dr. Jean Hertzberg Boulder, CO
- Received "Outstanding Teaching Assistant Award" - Dept. of Mechanical Engineering

Tutor 2006 - 2008
Clarkson University Potsdam, NY

Selected Honors and Awards

- Certificate of Teaching Enhancement, Montana State University, May 2017
- Faculty Award for Excellence, Montana State University, February 2017
- Harold C. Simmons Award, Institute for Liquid Atomization and Spray Systems, May 2014
- Research featured in "Science & Technology Review" a publication of Lawrence Livermore National Laboratory, `https://str.llnl.gov/june-2013`
- NASA Space Grant Graduate Fellowship, January 2012
- Graduate Student Service Award, March 2010 and March 2011 - Dept. of Mechanical Engineering, University of Colorado
- Outstanding Teaching Assistant Award 2009 - Dept. of Mechanical Engineering, University of Colorado
- Deans Outstanding Merit Fellowship 2008 - Clarkson University

· First place finish in AIAA Northeastern Regional Undergraduate Student Paper Competition 2008

· Phalanx Commendable Leadership Award 2008

· Robert E. Rosati '52 Award for Excellence in Mechanical Engineering 2007

Service and Outreach

Member at large 2016 - Present
Forum for Early Career Scientists (FECS) American Physical Society (APS)

· Forum meets the needs of early career scientists by offering support services and opportunities for increased inclusion and participation in activities and decision making

· Contributed article What Happens at the Division of Fluid Dynamics Meeting? to the Spring 2018, FECS Newsletter

Member 2016 - Present
Search Committee Montana State University, Dept. of Mech. Eng.

· Part of group to recruit four new tenure track faculty members

Representative 2014 - Present
Computer Committee Montana State University, Dept. of Mech. Eng.

· Committee decides computer purchases and policy

Representative 2015 - Present
High Performance Computing Advisory Group Montana State University

· Committee advises ITC on high performance computing decisions at the university level

Grant proposal reviewer 2015-Present

· National Science Foundation

Journal reviewer 2013-Present

· Journal of Computational Physics - Outstanding Reviewer (2017)
· International Journal of Multiphase Flows - Outstanding Reviewer (2017)
· Communications in Computational Physics
· Atomization and Sprays
· International Journal of Rotating Machinery
· Computers and Fluids
· Computational Geoscience

Volunteer 2015, 2016, 2017
NanoDays Montana State University

· Explored nano-scale fluid dynamics with high school students

Fluid Dynamics Program Instructor June 2013
4H Career Exploration Cornell University

· Led a group of high school students through a two-day exploration of fluid dynamics
· Designed and directed multiple experiments and demonstrations

Advisor/Mentor for Student Projects

Capstone Senior Design Projects

· Human Powered Vehicle 2015, 2016, 2017
· Project Tango Robot 2016
· Laboratory Experiment for EMEC 303 Course, 2016, 2017
· Fuel injection System Design 2015

Graduate Students under tutelage

Gerient Sis	MS	2017 - present
Will Krolick	MS	2016 - present
Clark Rubel	MS	2016 - present
Kris Olshefski	PhD	2018 - present
Brian Turnquist	PhD	2015 - present
Patrick Sheehy	MS	2016
Eric Cauble	MS	2016

Select Undergraduate Students under tutelage

Noah Anderson	2016 - present
Kris Olshefski	2017 - 2017
Tanner Ballance	2016 - 2017
Seth Whiteside	2016 - 2017
Grant Rydquist	2016 - 2016
Jacob Senecal	2014 - 2016
Robert Aaron Currie	2015 - 2016

Refereed Articles

Legend: Mark Owkes identified with **bold** , Students identified with underline

9. **Owkes**, M., Cauble, E., Senecal, J., Currie, A. (2018) "Importance of Curvature Evaluation Scale for Predictive Simulations of Dynamic Gas-Liquid Interfaces", Journal of Computational Physics, 365, 37-55.

8. Benson, M., Van Poppel, B., Elkins, C, **Owkes**, M. (2018) "Three Dimensional Velocity and Temperature Field Measurements of Internal and External Turbine Blade Features using Magnetic Resonance Thermometry", ASME Turbo Expo: Turbomachinery Technical Conference & Exposition, Oslo, Norway.

7. Sheehy, P., **Owkes**, M. (2017) "Numerical Study of Electric Reynolds Number of Electrohydrodynamic (EHD) Assisted Atomization", Atomization and Sprays, 27 (7) 645-664.

6. Garrick, D., **Owkes**, M., Regele, J. (2017) "A finite-volume HLLC-based scheme for compressible interfacial flows with surface tension", Journal of Computational Physics, 339 (3) 46-67.

5. **Owkes**, M., Desjardins, O. (2017) "A mass and momentum conserving unsplit semi-Lagrangian framework for simulating multiphase flows", Journal of Computational Physics, 332 (2) 21-46.

4. **Owkes**, M., Desjardins, O. (2014) "A mesh-decoupled height function method for computing interface curvature", Journal of Computational Physics, 281, 285-300.

3. **Owkes**, M., Desjardins, O. (2014) "A computational framework for three-dimensional, unsplit, geometric transport with applications to the volume-of-fluid (VOF) method", Journal of Computational Physics, 270 (1) 587-612.

2. Desjardins, O., McCaslin, J., **Owkes**, M., Brady, P., (2013) "Direct numerical and large-eddy simulation of primary atomization in complex geometries", Atomization and Sprays, 23 (11) 1001-1048.

1. **Owkes**, M., Desjardins, O. (2013) "A discontinuous Galerkin conservative level set scheme for interface capturing in multiphase flows", Journal of Computational Physics, 249 (15) 275-302.

Conference Proceedings

2017

42. Rydquist, G., Reckinger, S., **Owkes**, M., Wieland, S. (2017) "Potential Flow Model for Compressible Stratified Rayleigh-Taylor Instability" 70th Annual Meeting of the APS Division of Fluid Dynamics, Denver, CO.

41. **Owkes**, M. (2017) "Incorporating contact angles in the surface tension force with the ACES interface curvature scheme" 70th Annual Meeting of the APS Division of Fluid Dynamics, Denver, CO.

40. Olshefski, K., **Owkes**, M. (2017) "Load Balancing Strategies for Multiphase Flows on Structured Grids" 70th Annual Meeting of the APS Division of Fluid Dynamics, Denver, CO.

39. Turnquist, B., **Owkes**, M. (2017) "multiUQ: An intrusive uncertainty quantification tool for gas-liquid multiphase flows" 70th Annual Meeting of the APS Division of Fluid Dynamics, Denver, CO.

38. Krolick, W., **Owkes**, M. (2017) "Dynamic Mode Decomposition of a Numeric Simulation of a Jet in Crossflow" 70th Annual Meeting of the APS Division of Fluid Dynamics, Denver, CO.

37. Chiodi, R., **Owkes**, M., Desjardins, O. (2017) "The Importance of Mass and Momentum Conservation in Simulating Multiphase Flows" International Conference for Numerical Methods for Multiphase Flows - III, Tokyo, Japan.

36. **Owkes**, M. (2017) "Importance of Curvature Length Scale for Accurate Predictions of Dynamic Interfaces" 29th Annual Conference on Liquid Atomization and Spray Systems, Atlanta, GA.

35. Hagen, W., Garrick, D., **Owkes**, M., Regele, J. (2017) "Validation of a Compressible Interfacial Flow Solver Using Jet in Crossflow" 29th Annual Conference on Liquid Atomization and Spray Systems, Atlanta, GA.

2016

34. Desjardins, O., Chiodi, R., **Owkes**, M. (2016) "A Performance Comparison Between a Level Set Method and an Unsplit Volume of Fluid Method" 69th Annual Meeting of the APS Division of Fluid Dynamics, Portland, OR.

33. Senecal, J., **Owkes**, M. (2016) "Optimal Spatial Scale for Curvature Calculations in Multiphase Flows" 69th Annual Meeting of the APS Division of Fluid Dynamics, Portland, OR.

32. Rydquist, G., **Owkes**, M., VerHulst, C., Benson, M., Van Poppel, B., Burton, L., Eaton, J., Elkins, C. (2016) "Validation of Magnetic Resonance Thermometry by Computational Fluid Dynamics" 69th Annual Meeting of the APS Division of Fluid Dynamics, Portland, OR.

31. Regele, J., Garrick, D., Hosseinzadeh-Nik, Z., Aslani, M., **Owkes**, M. (2016) "A compressible multiphase framework for simulating supersonic atomization" 69th Annual Meeting of the APS Division of Fluid Dynamics, Portland, OR.

30. Turnquist, B., **Owkes**, M. (2016) "Intrusive Method for Uncertainty Quantification in a Multiphase Flow Solver" 69th Annual Meeting of the APS Division of Fluid Dynamics, Portland, OR.

29. Spirnak, J., Samland, M., Tremont, B., McQuirter, A., Williams, E., Benson, M., Van Poppel, B., VerHulst, C., Elkins, C., Burton, L., Eaton, J., **Owkes**, M. (2016) "Validation of Magnetic Resonance Thermometry through Experimental and Computational Approaches" AIAA Propulsion and Energy Forum and Exposition, Salt Lake City, UT.

28. **Owkes**, M., Van Poppel, B. (2016) "High-Fidelity Simulations of Realistic Electrically-Charged Atomizing Diesel-Type Jets" 28th Annual Conference on Liquid Atomization and Spray Systems, Dearborn, MI.

27. Turnquist, B., **Owkes**, M. (2016) "Framework for Uncertainty Quantification of Multiphase Flows Including Atomizing Jets" 28th Annual Conference on Liquid Atomization and Spray Systems, Dearborn, MI

26. Cauble, E., **Owkes**, M. (2016) "Least Square Curvature Calculation Method for VOF Schemes" 28th Annual Conference on Liquid Atomization and Spray Systems, Dearborn, MI

25. Garrick, D., **Owkes**, M., Regele, J. (2016) "A finite volume method for simulating droplet breakup in a supersonic cross flow" 28th Annual Conference on Liquid Atomization and Spray Systems, Dearborn, MI

24. Hosseinzadeh-Nik, Z., Aslani, M., **Owkes**, M., Regele, J. (2016) "Numerical simulation of a shock wave impacting a droplet using the adaptive wavelet- collocation method" 28th Annual Conference on Liquid Atomization and Spray Systems, Dearborn, MI

2015

23. Reckinger, S. M., Reckinger, S. J., **Owkes**, M., Rue, Y. (2015) "A day in the life of a fluid dynamicist " 68th Annual Meeting of the APS DFD Gallery of Fluid Motion, Boston, MA.

22. Gaillard, B., **Owkes**, M., Van Poppel, B. (2015) "High-Fidelity Simulations of Electrically-Charged Atomizing Diesel-Type Jets" 68th Annual Meeting of the APS Division of Fluid Dynamics, Boston, MA.

21. Cauble, E., **Owkes**, M. (2015) "Numerical Simulations of Droplet Dynamics in PEM Fuel Cell Microchannels" 68th Annual Meeting of the APS Division of Fluid Dynamics, Boston, MA.

20. Sheehy, P., **Owkes**, M. (2015) "Numerical study on influence of electric Reynolds and Peclet numbers on electrohydrodynamic assisted atomization" 68th Annual Meeting of the APS Division of Fluid Dynamics, Boston, MA.

19. Sheehy, P., **Owkes**, M. (2015) "Detailed numerical study of charge mobility on electrohydrodynamic assisted atomization" 27th Annual Conference on Liquid Atomization and Spray Systems, Raleigh, NC.

2014

18. **Owkes**, M., Herrmann, M., Desjardins, O. (2014) "Accurate VoF based curvature evaluation method for low-resolution interface geometries", 67th Annual Meeting of the APS Division of Fluid Dynamics, San Fransisco, CA.

17. **Owkes**, M., Desjardins, O. (2014) "Second-order and conservative numerical method for convection of variables with discontinuities", International Conference on Numerical Methods in Multiphase Flows, Darmstadt, Germany.

16. **Owkes**, M., Desjardins, O., Pai, M. (2014) "Large-eddy Simulation Study of Injector Geometry on Liquid Jet in Cross-flow and Validation with Experiments", Proceedings of ASME Turbo Expo, Düsseldorf, Germany

15. **Owkes**, M., Desjardins, O. (2014) "Consistent and conservative computational framework for simulations of electrohydrodynamic atomization", 26th Annual Conference on Liquid Atomization and Spray Systems, Portland, OR.

14. **Owkes**, M., Pai, M., Desjardins, O. (2014) "Large-eddy simulation study of injector geometry on liquid jet in cross-flow and validation with experiments", AIAA Science and Technology Forum and Exposition - 52nd Aerospace Sciences Meeting, National Harbor, MD.

2013

13. **Owkes**, M., Desjardins, O. (2013) "Direct numerical simulations of leaky dielectrics with application to electrohydrodynamic atomization", 66th Annual Meeting of the APS Division of Fluid Dynamics, Pittsburgh, PA.

12. **Owkes**, M., Desjardins, O. (2013) "Consistent and conservative computational framework for high density ratio simulations", 25th Annual Conference on Liquid Atomization and Spray Systems, Pittsburgh, PA.

11. **Owkes**, M., Desjardins, O. (2013) "Conservative, three-dimensional, unsplit, semi-Lagrangian flux scheme for volume-of-fluid methods", International Conference on Multiphase Flows, Jeju, Korea.

2012

10. **Owkes**, M., Desjardins, O. (2012) "Efficient high-fidelity simulation of pressure swirl injection", 65th Annual Meeting of the APS Division of Fluid Dynamics, San Diego, CA.

9. **Owkes***, M., Desjardins, O. (2012) "Towards direct numerical simulation of a pressure swirl injector", 24th Annual Conference on Liquid Atomization and Spray Systems, San Antonio, TX.

2011

8. **Owkes***, M., Desjardins, O. (2011) "Towards direct numerical simulation of pressure swirl injectors with realistic geometries", 64th Annual Meeting of the APS Division of Fluid Dynamics, Baltimore, MD.
7. **Owkes***, M., Desjardins, O. (2011) "A discontinuous Galerkin conservative level set scheme for simulating turbulent primary atomization", 23rd Annual Conference on Liquid Atomization and Spray Systems, Ventura, CA.
6. **Owkes***, M., Desjardins, O. (2011) "Experimental and numerical investigation of air-blast n-dodecane injection", 49th AIAA Aerospace Sciences Meeting, Orlando, FL.

2010

5. **Owkes***, M., Desjardins, O. (2010) "A quadrature-free discontinuous Galerkin conservative level set method", 63rd Annual Meeting of the APS Division of Fluid Dynamics, Long Beach, CA.
4. **Owkes***, M., Desjardins, O. (2010) "Quadrature-free discontinuous Galerkin level set scheme", 22nd Annual Conference on Liquid Atomization and Spray Systems, Cincinnati, OH.

2009

3. **Owkes***, M., Desjardins, O. (2009) "Direct numerical simulation of turbulent pipe flows subjected to transverse oscillations", 62nd Annual Meeting of the APS Division of Fluid Dynamics, Minneapolis, MN.
2. **Owkes***, M., Visser, K. (2009) "Feasibility of a Unique Wind Powered Home Heating System", 47th AIAA Aerospace Sciences Meeting, Orlando, FL.

2008

1. **Owkes***, M., Visser, K. (2008) "Feasibility of a Unique Wind Powered Home Heating System", AIAA Northeastern Regional Student Conference, Potsdam, NY.

* Published under pre-marriage surname Czajkowski

Invited Seminars and Lectures

12. Owkes, M., (2017) "Simulating Gas-Liquid Flows: Numerical Methods through Simulations on Supercomputers", John Hopkins University, Baltimore, MD
11. Owkes, M., (2017) "Simulating Gas-Liquid Flows: Numerical Methods through Simulations on Supercomputers", Clarkson University, Potsdam, NY
10. Owkes, M., (2017) "Simulating Gas-Liquid Flows: Numerical Methods through Simulations on Supercomputers", Binghamton University, Binghamton, NY
9. Owkes, M., (2017) "Simulating Gas-Liquid Flows: Numerical Methods through Simulations on Supercomputers", University of Michigan, Ann Arbor, MI
8. Owkes, M., (2015) "Using high-perfomance computing to study gas-liquid multiphase flows", Energy Research Institute Day, Montana State University, Bozeman, MT
7. Owkes, M., (2014) "The study of liquid sprays for combustion applications using supercomputers", Applied Math Department, Montana State University, Bozeman, MT
6. Owkes, M., (2014) "The study of liquid sprays for combustion applications using supercomputers", College of Engineering Seminar Series, Montana State University, Bozeman, MT
5. Owkes, M., Capecalatro, J. (2014) "Using supercomputers to study biofuel production and injection", United States Military Academy, West Point, NY

4. Owkes, M. (2014) "The study of liquid spray for combustion applications using supercomputers", Colorado School of Mines, Golden, CO
3. Owkes, M. (2014) "The study of liquid spray for combustion applications using supercomputers", Michigan Technological University, Houghton, MI
2. Owkes, M. (2014) "The study of liquid spray for combustion applications using supercomputers", Montana State University, Bozeman, MT
1. Owkes, M. (2011) "A novel numerical method for interface capturing in multiphase flows", Computational Fluids and Energy Systems, University of Colorado, Boulder, CO

Professional and Honor Societies

· American Physical Society (APS)
· American Institute of Aeronautics and Astronautics (AIAA)
· Institute for Liquid Atomization and Spray Systems (ILASS)
· American Society of Mechanical Engineers (ASME)
· Phalanx - Clarkson University's Highest Honorary society
· Tau Beta Pi - Engineering Honor Society
· Phi Kappa Phi - Honor Society

Professional Development

· Attended ASEE National Effective Teaching Workshop I (2016)
· Center for Faculty Excellence Certificate (2015)