

DAVID P. SCHMIDT

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Experience

University of Massachusetts, Amherst

9/00-present

Professor

Supervising graduate research in sprays, two-phase flow and teaching thermo-fluids courses. Awarded tenure and promoted from Assistant Professor in 2006. Graduate Program Director from 2009 to 2013. Promoted to Full Professor Sept. 2012.

University of Wisconsin, Madison

Summer 2013

Visiting Professor

Visiting the Nuclear Engineering and Engineering Physics Department

Massachusetts Institute of Technology, Sloan Automotive Lab

1/99-8/00

Visiting Scientist

Studied spray modeling, computational fluid dynamics (CFD), combustion, automotive fuel injection. Assisted in background research and proposal writing.

Co-founder of Convergent Thinking, LLC consulting firm

12/97-11/03

Owner

Helped to start a company that develops CFD software and spray models and performs CFD analyses. Though I divested in '03, the company still thrives under its new name, Convergent Science.

University of Wisconsin, Madison

8/93-12/98

Research Assistant, Lecturer, Post-doctoral researcher

Studied cavitation, boiling, high-speed nozzle flow, and sprays. Taught the energy systems lab and undergraduate heat transfer. Performed post-doctoral research on modeling, CFD, sprays, automotive fuel injection.

Stanford University

9/92-6/93

Research Fellow

Studied CFD, cloud formation, and experimental heat transfer.

Applied Research Associates, New England Division

6/92-9/92

Computer Programmer

Programmed in support of hydro-geologic analysis.

Argonne National Laboratory

6/90-8/90, 6/91-8/91

Student Researcher

Programmed in support of fluidized-bed combustion and magneto-hydrodynamics research.

Education

Ph.D. Mechanical Engineering at the University of Wisconsin, Madison

Minor in Nuclear Engineering

Dissertation: *Cavitation in Diesel Fuel Injector Nozzles*

Graduation: December 1997

M.S. Mechanical Engineering at Stanford University

Graduation: June 1993

B.S. Mechanical Engineering at North Carolina State University

Graduation: May 1992

Fellowships, Awards, and Honors

- Student-selected Mechanical Engineering Professor of the Year, 2022.
- Lewis F. Moody Award for Outstanding Original Paper in 2017 FED Conference, July 2018.
- Marshall Award for Best Paper at the 2016 ILASS North Americas Conference, May 2017.
- Norman Chigier Award for Reviewing Excellence, given by the American Editor-in-Chief of *Atomization and Sprays*, 2017.
- College of Engineering Outstanding Teacher Award, 2017.
- Appointed SAE Fellow, April 2017.
- Recognition of Excellence in Oral Presentation for “X-Ray Radiography and CFD Studies of the Spray G Injector,” SAE World Congress and Exposition, 2016.
- Recognition of service to the Institute of Liquid Atomization and Spray Systems, 2015.
- Ralph R. Teetor Educational Award, Society of Automotive Engineering, 2009.
- Student-selected Mechanical Engineering Advisor of the Year, 2008.
- SAE Long-time Member Service Award, 2008.
- Fellowship from the Institute for Advanced Studies, University of Bologna, 2006.
- Best Paper in Conference, ASME Internal Combustion Engine Division, 2003.
- College of Engineering Commencement Speaker, 2003.
- Student-selected Mechanical Engineering Professor of the Year, 2003.
- Student-selected Mechanical Engineering Advisor of the Year, 2003.

- Office of Naval Research Young Investigator Award, 2002.
- IgNobel Prize in the field of Physics, 2001.
- Semester Tuition Award from Chevron, University of Wisconsin, 1994.
- Myers-Uyhara Scholarship, University of Wisconsin, 1993.
- Departmental Research Fellowship, Stanford University, 1993.
- Graduated Magna Cum Laude, North Carolina State University, 1992.
- John T. Caldwell Alumni Scholarship, North Carolina State University, 1988-1992.
- University Scholars Program, North Carolina State University, 1988-1992.
- National honor society of Phi Kappa Phi, NCSU, 1991-1992.
- North Carolina Fellows Program, NCSU, 1990-1992.

Grants

Park, Chul (PI), Daehwan Rhu, David P. Schmidt, John E. Tobiason , "REU supplement to PFI-RP: Developing Light-Controlled Mixing to Advance Energy Efficient Wastewater Treatment by Oxygenic Photogranules," NSF, 2022-2023, \$16,000.

Schmidt, D. (PI), "Spray Combustion Consortium II: Engineering-level Modeling of Gasoline and Diesel Fuel Injection," sub. to Sandia National Laboratory, 2021-2022, \$122,999.

Schmidt, D. (PI), "ICEnet Consortium," from Siemens, Cummins, AVL, Convergent Science, and Mathworks, 2019-2021, \$270,000.

Park, Chul (PI), Daehwan Rhu, David P. Schmidt, John E. Tobiason , "PFI-RP: Developing Light-Controlled Mixing to Advance Energy Efficient Wastewater Treatment by Oxygenic Photogranules," NSF, 2019-2022, \$550,000.

Schmidt, D. (PI), Chen, Wen, Dimitrakopoulos, Christos, Grosse, Ian, Hyers, Robert, Lee, Jae-Hwang, Maroudas, Dimitrios, Nonnenmann, Stephen, Ramasubramaniam, Ashwin, Rothstein, Jonathan, Schiffman, Jessica, Watkins, James, "Intelligent Materials by Design," ARL, 2018-2020, \$1,000,000.

Schmidt, D. (PI) Coughlin, Edward, Dimitrakopoulos, Christos, Grosse, Ian, Hyers, Robert, Lee, Jae-Hwang, Maroudas, Dimitrios, Nonnenmann, Stephen, Ramasubramaniam, Ashwin, Rothstein, Jonathan, Schiffman, Jessica, Watkins, James, "Cold Spray: Basic Physics and Applications," ARL, 2017-2019, \$900,000.

Schmidt, D. (PI), "Coupling Internal Flash Boiling Flow to External Spray Modeling," Toyota, 2017-2018, \$115,411.

Schmidt, D. (PI), and M. Lackner, "Application of an Advanced Adaptive Mesh Paradigm to Wind Energy Simulations (expanded)," Convergent Science, unrestricted grant, 2017, \$37,000.

Schmidt, D. (PI), and M. Lackner, "Application of an Advanced Adaptive Mesh Paradigm to Wind Energy Simulations," Convergent Science, unrestricted grant, 2017, \$34,000.

Schmidt, D, "Literature review for spray correlations," Bete Fog Nozzle Unrestricted Grant, 2017, \$2,234.

Schmidt, D., "Flash Boiling Fuel Injection Modeling," Ford Motor Company Unrestricted Grant, 2017, \$70,000.

Schiffman, J., A. Briseno, C. Dimitrakopoulos, I. Grosse, J. Klier, J.-H. Lee, D. Maroudas, A. Ramasubramaniam, D. Schmidt, J. Watkins, "Multifunctional cold spray coatings," Army Research Lab, 2016-2017, \$750,000.

McDonell, V.(PI), Scott Brown, David P. Schmidt, "Cavitation Simulations for Fuel Insensitive Fuel Injection (SBIR Phase 2)" AFRL, 2017-2018, \$203,770 to UMass.

Lackner, M. (PI), S. Arwade, D. Schmidt, "Simulating breaking waves and estimating loads on offshore wind turbines using computational fluid dynamic models," Bureau of Offshore Energy Management, US Dept. of Interior, 2016-2018, \$144,342.

Schmidt, David P , C. Dimitrakopoulos, J-H Lee, J. Lee, D. Maroudas, A. Ramasubramaniam, J. Rothstein, "Collective Thermomechanical Processing of Materials by Design," Army Research Lab, 2016-2017, \$399,999.

Schmidt, David (PI), "Needle dynamics and LES Simulation in GDI Calculations," General Motors, 2016, \$50,000.

Schmidt, D. (PI), and M. Lackner, "Application of an Advanced Adaptive Mesh Paradigm to Wind Energy Simulation," Convergent Science, unrestricted grant, 2016 \$22,462.

Schmidt, D. (PI), "Spray Combustion Consortium: Engineering-level Modeling of Gasoline and Diesel Fuel Injection," sub. to Sandia National Laboratory, 2016-2020, \$448,000.

Schmidt, D. (PI), "Continuation of Flashing Fuel Spray Modeling," Ford Motor Company, unrestricted grant, 2015, \$69,313.

McDonell, V.(PI), Scott Brown, David P. Schmidt, "Cavitation Simulations for Fuel Insensitive Fuel Injection (SBIR Phase 1)," AFRL, 2015-2016, \$39,850 of \$150,000.

Schmidt, David (PI), D. Maroudas, A. Ramasubramaniam, Schiffman, J. Rothstein, "Cold spray of nano-particle biocidal coatings and modeling of graphene polymer composites," ARL, 2014-2015, \$200,000.

Schmidt, David (PI), "Development of an Integrated CFD Approach for Internal Nozzle Flows," General Motors, 2014-2015, \$71,334.

Schmidt, David (PI), "Flashing Fuel Spray Modeling," Ford Motor Company, unrestricted grant, 2014, \$50,000.

Fisher, Donald (PI) and David P. Schmidt, unrestricted grant, Convergent Science, 2014, \$6,000

Schmidt, David (PI), "Development of an Integrated CFD Approach for Internal Nozzle Flows and Sprays using a Compressible Two-Phase Flow Approach coupled with Eulerian-Lagrangian-Spray-and-Atomization (ELSA) Model," General Motors, 2013-2014, \$200,000

Schmidt, David (PI), Jonathan Rothstein, Robert Hyers, "Exploration of Novel Cold Spray Applications," ARL, 2013-2014, \$180,000

Schmidt, David (PI) and Robert Hyers, "Initial Cold Spray Modeling Investigation," ARL, 2013-2014, \$75,000

Schmidt, David (PI), "Heat Transfer and Surface Roughness Modeling in Cavitation and Flash-boiling Simulations", General Motors, 2012-2013, \$64,000

Schmidt, David (PI), “Effects of Non-Condensable Gasses in Cavitation and Flash-boiling Simulations”, General Motors, 2012-2013, \$118,647

Schmidt, David (PI), “Compressibility Effects in Cavitation and Flash-boiling Simulations”, General Motors, 2012-2013, \$73,742

Jonkman, Jason (PI) (NREL), M. Lackner and D. Schmidt (UMass) , P. Sclavounos (MIT), “Floating Platform Dynamics Models,” DOE, 2012-2016, \$193,000 to UMass of \$1.1M.

Patek, Sheila (PI), Modarres-Sadeghi, Yahya, Schmidt, D. Armstrong Fund for Science, "The evolution of cavitation in biological systems and biologically-inspired design," 2011-2012, \$40,000.

Schmidt, David (PI), “Modeling the internal flow of fuel injector and its impact on spray structure, mixture formation, ignition and combustion in IC engines,” General Motors, 2011-2013, \$258,951.

Knaus, Darin (PI) (Creare Inc.) and Phillips , S., Schmidt D., “SBIR Phase I: Improved Fuel Spray Models for Augmentors,” Air Force, 2009, \$30,000 of \$100,000 (performed as consulting with Mr. Nat Trask)

McDonell, Vince (PI) (ERC) and David P. Schmidt, “Modeling Multi-Component Bubble Growth,” 2009-2011, \$30,000

Schmidt, David (PI), “Improvement and Exercising of a New Flash-boiling Model Capability”, General Motors, 2008-2010, \$124,000

Bergander, Mark (PI) (Magnetic Development Inc), Schmidt D. “ STTR Phase II: Condensing Ejector for Second-Step Compression in Reversed Rankine Cycle,” 2008-2010, \$243,467 of \$500,000.

Heister, Stephen (PI) (Purdue), William E. Anderson, Carlos M. Corvalan, Osvaldo H. Campanella, Robert P. Lucht, Charles L. Merkle, Paul E. Sojka, Steven F. Son, David P. Schmidt, T. J. Mountzarias, Terrence R. Meyer, “Spray and Combustion of Gelled Hypergolic Propellants,” DoD MURI, 2008-2014, \$1M to UMass of \$6.25M.

Meyer, Terrance (PI) (Iowa State), Schmidt D., “STTR Phase II: Imaging sprays in harsh environments,” AFOSR, 2006-2007, \$85,000 of \$500,000.

Knaus, Darin (PI) (Creare Inc.), Phillips, S., Schmidt D., “SBIR Phase I: Composite Models of Sprays in Cross-Flow,” ONR, 2007, \$22,000 of \$70,000.

Rothstein, Jonathan (PI) and Schmidt D., “Modeling and Experiments with Non-Newtonian Inks” Kodak, 2006-2007, \$100,000.

Fotache, Catalin (PI) (UTRC), Schmidt, D, J. Lee, “Validated Computational Tools for Low Emissions Supersonic Combustors using Superheated/Supercritical Fuels,” NASA, 2006-2010, \$172,000 of \$634,000.

Schmidt, David P. (PI) “Modeling flash-boiling fuel injection,” General Motors, 2006-2007, \$91,000.

Meyer, Terrance (PI) (Iowa State), Schmidt D., “STTR Phase I: Imaging sprays in harsh environments,” AFOSR, 2006-2007, \$25,000 of \$100,000.

Bergander, Mark (PI) (Magnetic Development Inc.), Schmidt D. “ STTR Phase I: Condensing Ejector for Second-Step Compression in Reversed Rankine Cycle,” 2006-2007, \$65,000 of \$150,000.

Schmidt, David P. (PI), Perot, J. B., “SGER: Direct Numerical Simulation of Turbulent Drop Dispersion using Interface Tracking,” National Science Foundation, 2003-2004, \$99,500.

Schmidt, David P. (PI), “Understanding Grid Dependency in Spray Calculations,” General Motors, Inc., 2002-2003, \$42,000.

Schmidt, David P. (PI), “Direct Simulation of Primary Atomization,” Office of Naval Research Young Investigator Award, 2002-2006, \$300,000.

de Bruyn Kops, S. (PI), Schmidt, David P., “Modeling Turbulent Droplet-Laden Flow,” Fluent Inc., 2004, \$10,000.

Schmidt, David P. (PI), “Modeling drag in dense sprays,” General Motors, 2004-2005, \$35,000.

Schmidt, David P. (PI) “Cavitation modeling,” Argonne National Laboratory, 2003, \$10,000.

Schmidt, David P. (PI), “Modeling MEMS Fuel Injection,” Caterpillar Inc., 2001-2004, \$142,000.

Schmidt, David P. (PI), “Establishment of a Spray Simulation Demonstration Test Code,” Faculty Research Grant, 2001, \$15,000.

Schmidt, David P. (PI), “Numerical Methods of Discrete Particle Spray Simulation,” Fluent Inc., 2000, \$10,000.

Nishita Nickey, David P. Schmidt (advisor), Commonwealth College Research Assistant Fellowship for an MIE Undergrad, 2004, \$1,000.

Graduate Students and Post-doctoral Researchers

Dai, Meizhong, MS, “Numerical simulation of capillary pinching using an unstructured mesh and finite volume method,” 2002.

Are, Sasanka, MS Applied Math, “Understanding grid dependency in spray calculations,” 2003.

Lutzmann, Stefan, hosted as a visiting student, Univ. of Stuttgart, “Efficient calculation of droplet evaporation,” 2003.

Frain, Matt, Ph.D., “Investigation of the influence of gas and solid particle interaction on the heat transfer effectiveness of a falling-bed heat exchanger,” 2004.

Moningi, Manoj Kumar, M.S., “Modeling modulated pressure-swirl atomizers,” 2004.

Schwarzer, Volker, visiting student, Univ. of Karlsruhe, “Effect of wind on flow in reservoirs,” 2004.

Hou, Shuhai, Ph.D., “Investigation of the interaction mechanisms between closely spaced sprays from micro-hole nozzles,” 2005.

Dai, Meizhong, Ph.D., “Numerical simulation of free surface flow using a moving, unstructured mesh method,” 2005.

Toninel, Stefano, hosted as a visiting student, Univ. of Bologna, “Development of a parallel finite-volume Navier-Stokes solver,” 2005.

Quan, Shaoping, Ph.D., “Direct numerical simulation of two-phase flow,” 2005.

O’Brien, Michael, M.S., “Modeling drag in dense sprays,” 2006.

Hebert, David, “Analysis of Direct Simulation of a Spray in Cross-Flow.” Post-doctoral researcher, 2007.

Gopalakrishnan, Shivasubramaniam, Ph.D., “Modeling of Thermal Non-Equilibrium in Superheated Injector Flows,” 2009.

Trask, Nathaniel, M.S., “Implementation of an Eulerian Atomization Model to Characterize Primary Spray Formation,” 2010.

Nerookar, Kshitij, Ph.D., “Three Dimensional Flash-Boiling Calculations in Fuel Injector Nozzles,” 2010.

Menon, Sandeep, Ph.D., “A moving mesh simulation of Non-Newtonian flow,” 2011.

Samel, Mihir, M.S., “Modeling Particle Laden Flows at Low Ambient Pressure,” 2011.

Colorassi, Michael, M.S., “Modeling Condensing Ejectors using CFD,” 2011.

Furlong, Thomas, M.S., “A Computational Simulation of Supercritical Carbon Dioxide and Ethanol Capillary Flow,” 2011.

Nerookar, Kshitij, Post-doctoral Researcher., “Modeling the Internal Flow of Fuel Injector and its Impact on Spray Structure, Mixture Formation, Ignition and Combustion,” 2011-2013.

Rakshit, Sukanta, M.S., “A New Approach to Compressible Cavitation Modeling in Fuel Injector Nozzles,” 2012.

Cox, Suzanne, MS “Physical Model of the Feeding Strike of the Mantis Shrimp”, 2013.

Shields, Bradley, M.S., “Non-Equilibrium Modeling of Cavitating Nozzles”, 2014.

Venkata Pavan P. Narasimha Rao, M.S., “An Exact Solution to the Space Conservation Law,” 2014.

Wang, Yue, Post-doctoral Researcher, “An Integrated CFD Approach for Internal Nozzle Flows and Sprays using a Compressible Two-Phase Flow Approach coupled with Eulerian-Lagrangian-Spray-and-Atomization (ELSA) Model”, 2013-2014.

Benitz, Maija, Ph.D., co-advised with Prof. Matt Lackner, “Modeling Wave Impacts on Off-Shore Wind Turbines”, 2016.

Mooney, Kyle, Ph.D., “Non-Newtonian Droplet Dynamics,” Ph.D., 2016.

Baldwin, Eli, Ph.D., 2016, “Turbulent Mixing in Sprays for Propulsion Applications”

Rachakonda, Sampath, Ph.D., 2018, “Flash boiling spray simulation”.

Klymko, Volodymyr, visiting Fulbright Fellow, 2017-2018

Dias Ribeiro, Mateus, visiting doctoral student from Brazil, 2017-2019.

Jacobsohn, Gabriel, MS, 2019, “On the Fuel Spray Applications of Multi-Phase Eulerian CFD Techniques”.

Mitra, Peetak, Ph.D., 2021, “Numerical Modeling of Advanced Propulsion Systems”.

Johlas, Hannah, PhD., co-advised by Prof. Matt Lackner, 2021, “Simulating the Effects of Floating Platforms, Tilted Rotors, and Breaking Waves for Offshore Wind Turbines.

Mohapatra, Chinmoy, PhD., 2022, “Computational Study of Internal Flow, Near Nozzle and External Spray of a GDI Injector Under Flash Boiling Conditions”.

Haghshenas, Majid, post-doctoral researcher, 2019-2021.

Service

Energy Transition Institute Committee on the Sustainable Engineering Laboratory Building, co-Chair, 2022.

Departmental Personnel Committee, Chair, 2021-2022.

Ad-hoc member, Department Personnel Committee, 2019-2020.

Graduate Committee, 2019-2020.

Chair, Department Personnel Committee, 2015-2016, 2017-2018.

Member of College of Engineering Committee to Revise Computer Services, 2012.

Area Coordinator for Engine Combustion Network's Internal Flow Group, 2012-2014.

Graduate Program Director of the Mechanical and Industrial Engineering Department, 2009-2013.

College Personnel Committee, 2009-2011. Chair of CPC for 2009-2010.

Board member of the Institute for Liquid Atomization and Spray Systems (ILASS), 2009-2014.

Editor of the Institute for Liquid Atomization and Spray Systems (ILASS) newsletter, 2006-2008.

Member of the Editorial Board for *Atomization and Sprays*, 2005-present.

College Computing Services Committee, 2004.

Advisor for the Supermileage Vehicle, 2002-2004, 2005-2010.

Departmental Personnel Committee, 2002-2003.

Session Chair and Organizer, ASME Internal Combustion Engine Section, 2001 and 2002.

Faculty Advisor for the Student ASME chapter, 2001-2002.

Supervised Undergraduate Researcher, HSSIP program, 2001.

Space Allocation ad-hoc Committee, 2001.

Undergraduate Committee, 2000-2002.

Presented to Dean's Advisory Council, 2000 and 2003.

Reviewer for *Journal of Fluid Mechanics*, *Intl. Journal of Numerical Methods in Fluids*, *Atomization and Sprays*, *Journal of Computational Physics*, *Journal of Applied Fluid Mechanics*, *Journal of Engineering and Power*, *Journal of Heat Transfer and Intl. Journal of Heat and Mass Transfer*, *Microfluidics and Nanofluidics*, *Rheologica Acta*, Society for Automotive Engineering Congress, American Society of Mechanical Engineering Internal Combustion Engine Div.

Past proposal reviewer for DOE MICS and NSF Multiphase Flow directorate.

Patents

[P1] Jim Watkins, David Schmidt, Jacobo Morere Rodriguez, Victor Champagne, “Active Cooling of Cold-Spray Nozzles by Compressed Gas Expansion” (joint w/ Army Research Laboratory) Patent number 11,148,153, awarded October 19, 2021.

Journal Publications

[J1] Nino Figliola, David P. Schmidt, Jae-Hwang Lee, Pressure- and Size-Dependent Aerodynamic Drag Effects on Mach 0.3–2.2 Microspheres for High-Precision Micro-Ballistic Characterization. *Applied Sciences*. 2022; 12(13):6622.

[J2] David P. Schmidt et al., “The Eulerian Lagrangian Mixing-Oriented (ELMO) Model,” *International Journal of Multiphase Flow*, 2022.

[J3] Johlas, Hannah M. and Schmidt, David P. and Lackner, Matthew A., “Large Eddy Simulations of Curled Wakes from Tilted Wind Turbines,” *Renewable Energy*, v. 188, 2022. <http://dx.doi.org/10.2139/ssrn.3875189>.

- [J4] David Schmidt, Romit Maulik, and Konstantinos Lyras, "Machine-learning accelerated turbulence modelling of transient flashing jets," *Physics of Fluids*, 33(12) 2021.
- [J5] Chinmoy K. Mohapatra, Gabe L. Jacobsohn, David P. Schmidt, "The end of injection study of a multi-hole gasoline direct injector under flash-boiling conditions", *Atomization and Sprays*, 2021. DOI: 10.1615/AtomizSpr.2021038745.
- [J6] Haghshenas, Majid, Peetak Mitra, Niccolò D. Santo, and David P. Schmidt 2021. "Acceleration of Chemical Kinetics Computation with the Learned Intelligent Tabulation (LIT) Method" *Energies* 14, no. 23: 7851.
- [J7] Johlas, Hannah M., Luis A. Martínez-Tossas, Matthew J. Churchfield, Matthew A. Lackner, and David P. Schmidt. "Floating platform effects on power generation in spar and semisubmersible wind turbines." *Wind Energy* (2021).
- [J8] Chinmoy K. Mohapatra, David P. Schmidt, Brandon a. Sforzo, Katarzyna E. Matusik, Zongyu Yue, Christopher F. Powell, Sibendu Som, Balaji Mohan, Hong G. Im, Jihad Badra, Mathis Bode, Heinz Pitsch, Dimitrios Papoulias, Kshitij Neroorkar, Samir Muzaferija, Pedro Marti-Aldaravi, Maria Martinez, "Collaborative Investigation of the Internal Flow and Near-nozzle Flow of a 8-Hole Gasoline Injector (ECN Spray G)," *International Journal of Engine Research*, June 2020.
- [J9] Piotr Liebersbach, Alden Foelsche, Victor K. Champagne, Matt Siopis, Aaron Nardi, and David P. Schmidt, "CFD Simulations of Feeder Tube Pressure Oscillations and Prediction of Clogging in Cold Spray Nozzles," *Journal of Thermal Spray Technology*, v. 29(3), pp. 400-412, 2020. *This article was one of six Editor's Choice Selections for 2020. The article is made freely available to the public.*
- [J10] Mateus Dias Ribeiro, Alex Mendonça Bimbato, Maurício Araújo Zanardi, José Antônio Perrella Balestieri, and David P Schmidt, "Large-eddy simulation of the flow in a direct injection spark ignition engine using an open-source framework," *International Journal of Engine Research*, 2020.
- [J11] Sampath Rachakonda, Arman Paydarfar and David Schmidt, "Prediction of spray collapse in multi-hole gasoline direct injection (GDI) fuel injectors," *International Journal of Engine Research*, v. 20, pp. 18-33, 2019.
- [J12] Sampath Rachakonda, Arman Paydarfar and David Schmidt, "Internal Flow in a Single-Hole Asymmetric Nozzle: Effect of the Drill Angle and Nature of the Counter-Bore," *SAE International Journal of Engines*, in press, 2019.
- [J13] Sampath K Rachakonda, Yue Wang, Ronald O Grover Jr, Maryam Moulai, Eli Baldwin, Gaoming Zhang, Scott Parrish, Ramachandra Diwakar, Tang-Wei Kuo, David P Schmidt, "A computational approach to predict external spray characteristics for flashing and cavitating nozzles," *International Journal of Multiphase Flow*, 106, 21-33, 2018.
- [J14] David P. Schmidt and Frederick Bedford, "An Analysis of the Convergence of Stochastic Lagrangian/Eulerian Spray Simulations," *International Journal of Multiphase Flow*, 102, 95-101, 2018.
- [J15] Konstantinos Lyras, Siaka Dembele, David P. Schmidt, and Jennifer X. Wen, "Numerical simulation of subcooled and superheated jets under thermodynamic non-equilibrium," *International Journal of Multiphase Flow*, 102, 16-28, 2018.
- [J16] Rachakonda S, Wang Y, Grover R, Moulai M, Baldwin E, Zhang G, Parrish S, Diwakar R, Kuo T-W, and Schmidt D, "A Computational Approach to Predict External Spray Characteristics for Flashing and Cavitating Nozzles", *International Journal of Multiphase Flow*, 106, 21-33, 2018.

- [J17] Rachakonda S, Wang Y, Schmidt D, "Flash-Boiling Initialization for Spray Simulation Based on Parametric Studies", *Atomization and Sprays*, 28 (2), 2018.
- [J18] Bush Trenton B., Zahra Khalkhali, Victor Champagne, David P. Schmidt, and Jonathan P. Rothstein "Optimization of Cold-Spray Deposition of High Density Polyethylene Powders," *J. Thermal Spray Tech.*, 26(7), 1548-1564, 2017.
- [J19] Bush, T. B., Z. Khalkhali, D. P. Schmidt, and J. P. Rothstein, "Cold spray deposition of high density polyethylene powders," *J. Therm. Spray Technol.* 26, 1548-1564 (2017).
- [J20] Duke, D., A. Kastengren, K. Matusik, , A. Swantek, C. Powell, R. Payri, D. Vaquerizo, L. Itani, G. Bruneaux, R. Grover, S. Parrish, L. Markle, D. Schmidt, J. Manin, S. Skeen, L. Pickett, "Internal and Near Nozzle Measurements of Engine Combustion Network 'Spray G' Gasoline Direct Injectors," *Experimental Thermal and Fluid Science*, 88, 608-621, 2017.
- [J21] Duke, D., Finney, C., Kastengren, A., Matusik, K. et al., "High-Resolution X-Ray and Neutron Computed Tomography of an Engine Combustion Network Spray G Gasoline Injector," *SAE Int. J. Fuels Lubr.* 10(2):2017, doi:10.4271/2017-01-0824.
- [J22] Pandal, A., Pastor, J., Payri, R., Kastengren, A. et al., "Computational and Experimental Investigation of Interfacial Area in Near-Field Diesel Spray Simulation," *SAE Int. J. Fuels Lubr.* 10(2):2017, doi:10.4271/2017-01-0859.
- [J23] E. T. Baldwin, R. O. Grover Jr., S. E. Parrish, D. J. Duke, K. E. Matusik, C. F. Powell, A. L. Kastengren, D. P. Schmidt, "String Flash-Boiling in Gasoline Direct Injection Simulations with Transient Needle Motion," *Intl. J. of Multiphase Flow*, v. 87, pp. 90-101, 2016.
- [J24] M.A. Benitz, D.W. Carlson, B. Seyed-Aghazadeh, Y. Modarres-Sadeghi, M.A. Lackner, D.P. Schmidt, "CFD simulations and experimental measurements of flow past free-surface piercing, finite length cylinders with varying aspect ratios," *Computers & Fluids*, v. 136, pp. 247-259, 2016.
- [J25] J.M. García-Oliver, J.M. Pastor, A. Pandal, E. Baldwin, and D.P. Schmidt, "A Consistent, Scalable Model for Eulerian Spray Modeling," *Intl. J. of Multiphase Flow*, v. 83, pp. 162-171, 2016.
- [J26] J.M. Desantes, J.M. Garcia-Oliver, J.M. Pastor, A. Pandal, E. Baldwin, D.P. Schmidt, "Coupled/Decoupled Spray Simulation Comparison of the ECN spray A Condition with the Sigma-Y Eulerian Atomization Model," *Intl. J. of Multiphase Flow*, v. 80, 89-99, 2016.
- [J27] Sandeep Menon, Kyle G. Mooney, K.G. Stapf, David P.Schmidt, "Parallel Adaptive Simplicial Re-Meshing for Deforming Domain CFD Computations," *J. of Comp. Phys.*, v. 298, 62-78, 2015.
- [J28] M.A. Benitz, M.A. Lackner, D.P. Schmidt, "Hydrodynamics of offshore structures with specific focus on wind energy applications," *Renewable and Sustainable Energy Reviews*, v. 44, 692-716, 2015.
- [J29] Q. Xue, M. Battistoni, C. F. Powell, D. E. Longman, S.P. Quan, E. Pomraning, P. K. Senecal, D. P. Schmidt, S. Som, "An Eulerian CFD Model and X-ray Radiography for Coupled Nozzle Flow and Spray in Internal Combustion Engines," *Intl. J. of Multiphase Flow*, v. 70, 77-88, 2015.
- [J30] Philipp Pischke, R. Kneer, David P. Schmidt, "A comparative validation of concepts for Monte Carlo collision algorithms," *Computers and Fluids*, v. 113, 77-86, 2015.

- [J31] Daniel Duke, Andrew Swantek, Zak Tilocco, Alan Kastengren, Kamel Fezzaa, Kshitij Neroorkar, Maryam Moulai, Christopher Powell, David Schmidt, "X-ray Imaging of Cavitation in Diesel Injectors," *Journal of Engines*, 7(2):1003-1016, 2014.
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- [C5] Mitra, P., Haghshenas, M., Dal Santo, N., Ribeiro, M. D., Mitra, S., Daly, C., & Schmidt, D. (2021). *Analysis and Interpretation of data-driven closure models for Large Eddy Simulation of Internal Combustion Engines* (No. 2021-01-0407). SAE World Congress.
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- [C13] Gabriel Lev Jacobsohn, Chinmoy Mohapatra, Ronald Grover, Daniel Duke, David Schmidt, "Comparison of Turbulence Modeling Methods for Evaluating GDI Sprays with Transient Needle Motion," WCX SAE World Congress, 2019.
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- [C74] Meizhong Dai, Shaoping Quan, S. Gopalakrishnan, and David P. Schmidt, "Direct Numerical Simulation of Multiphase Flows," ONR Contractors Meeting, Monterey, CA, 2005.
- [C75] Meizhong Dai and David P. Schmidt, "Numerical Simulation of Droplet Collision Using a Moving Mesh Method," ILASS Conference, Irvine CA, 2005.
- [C76] Shuhai Hou and David P. Schmidt, "Interaction Mechanisms Between Closely Spaced Sprays From Micro-Hole Nozzles," ILASS Conference, Irvine CA, 2005.

- [C77] J. B. Perot and D. Schmidt, "Unstructured Adaptive Moving Mesh Solution of Unsteady Shear Flows and Free Surface Flows," Proceedings of the 4th International Symposium on Turbulence and Shear Flow Phenomena, Williamsburg, VA, June 2005.
- [C78] Shaoping Quan and David P. Schmidt, "An Interface Tracking With Moving Mesh for Simulation of Three-Dimensional Two-Phase Flows, ILASS Conference, Irvine CA, 2005.
- [C79] Andreas M. Lippert, Shengming Chang, Sasanka Are, David P. Schmidt, "Mesh Independence and Adaptive Mesh Refinement for Advanced Engine Spray Simulations," SAE Congress, Detroit, Paper 2005-01-0207, 2005.
- [C80] Meizhong Dai, Shaoping Quan, and David P. Schmidt, "Two Phase Flow Calculations with Interface Tracking," ONR Propulsion Meeting, Cambridge, MA, 2004.
- [C81] Meizhong Dai, Shaoping Quan and David P. Schmidt, "Direct Numerical Simulation of Multiphase Flows," ILASS Conference, Arlington VA., 2004.
- [C82] David P. Schmidt, "High Spatial Accuracy in Gas-to-Liquid Coupling in Eulerian/Lagrangian CFD," ILASS Conference, Arlington VA., 2004.
- [C83] Shuhai Hou and David P. Schmidt, "Modeling Droplet Collision With Adaptive Meshing and Updated Outcomes," SAE Congress, Detroit, 2004, Paper 2004-01-0533.
- [C84] Meizhong Dai, Shaoping Quan, and David P. Schmidt, "New Numerical Methods in Two-Phase Flow," ONR Propulsion Meeting, Stanford, Dec. 2003.
- [C85] Sasanka Are, Shuhai Hou, and David P. Schmidt, "Second Order Spatial Accuracy in Spray Calculations," *ICLASS*, Sorrento, Italy, 2003.
- [C86] Meizhong Dai and David P. Schmidt, "Calculation of Ligament and Droplet Dynamics," Int'l Colloq. on Combustion and Noise Control, Cranfield UK, August 2003.
- [C87] David P. Schmidt, Meizhong Dai, and Shaoping Quan, "Direct Simulation of Primary Atomization," ONR Propulsion Meeting, Los Angeles, July, 2003.
- [C88] Shuhai Hou, Sasanka Are, David P. Schmidt, "A Generalized Adaptive Collision Mesh for Multiple Injector Orifices," Multi-dimensional Engine Modeler's User Group Meeting, Detroit, 2003.
- [C89] David P. Schmidt, "Direct Simulation of Primary Atomization," ONR Contractors Meeting, 2002.
- [C90] Meizhong Dai, J. Blair Perot, David P. Schmidt, "Heat Transfer within Deforming Droplets," Fall ASME ICE Meeting, New Orleans, 2002.
- [C91] Meizhong Dai, Haoshu Wang, J. Blair Perot, and David P. Schmidt, "A Numerical Method for Interface Tracking", 15th ILASS Meeting, Madison, WI, 2002.
- [C92] David P. Schmidt and C.J. Rutland, "Reducing Grid Dependency in Droplet Collision Calculations," Fall ASME ICE Meeting, Argonne National Laboratory, 2001.
- [C93] David Schmidt, et al., "Review and Assessment of Fuel Effects and Research Needs in Clean Diesel Technology," Spring ASME ICE Meeting, Philadelphia, 2001.
- [C94] David P. Schmidt and C.J. Rutland, "Numerical Issues in Droplet Collision Modeling," Multi-dimensional

Engine Modeler's User Group Meeting, Detroit, 2001.

- [C95] David P. Schmidt, M. L. Corradini, and C. J. Rutland, "A Two-Dimensional, Non-Equilibrium Model of Flashing Nozzle Flow," 3rd ASME/JSME Joint Fluids Engineering Conference, 1999.
- [C96] Jeffrey A. Hoffman, Idriss Nouar, David P. Schmidt, Jay K. Martin, and Chris Rutland, "The Experimental Comparison of a Single-Liquid High-Pressure Spray Model," ILASS-98 Americas Conference, Sacramento, 1998.
- [C97] David P. Schmidt and M. L. Corradini, "Extending Cavitation Models to Subcooled and Superheated Nozzle Flow," Nureth-8 Conference, Japan, 1997.
- [C98] David P. Schmidt and M. L. Corradini, "One-Dimensional Analysis of Cavitating Orifices," ILASS-96 Americas Conference, San Francisco, 1996.
- [C99] David P. Schmidt, T.-F. Su, K. H. Goney, P. V. Farrell, and M. L. Corradini, "Detection of Cavitation in Fuel Injector Nozzles," *Transport Phenomena in Combustion*, ed. S. H. Chan, Taylor and Francis, 1996.

Book Chapters and Other Scholarly Publications

- [B1] Forward for Jens Höpken, Kyle Mooney, and Tomislav Maric, *The OpenFOAM Technology Primer*, 2nd ed., 2021.
- [B2] Forward for Bernard Schmidt, *American Literary Personalism: Rise and Decline*, Mellon Press, 2004.
- [B3] Meizhong Dai and David P. Schmidt, "Calculation of Droplet and Ligament Dynamics," *Advances in Combustion and Noise Control*, G. Roy, G., K. Yu, J. Whitelaw, and J. Witton, ed., Cranfield University Press, 2004.
- [B4] David P. Schmidt, "Direct Simulation of Primary Atomization," *Chemical Propulsion: New Horizons*, Gabriel Roy, ed., CRC Press, 2001.

Invited Presentations

David P. Schmidt, Keynote Presentation, "How the Experimentalists Launched a Revolution in Spray Modeling," International Conference on Liquid Atomization and Spray Systems, August 2021.

David P. Schmidt, Lightning Round-Table Discussion Agility in the Classroom - Lighthouse Industry-Academic Collaborations, ASEE Conference, August 2021.

David P. Schmidt, Invited Presentation, "Accelerated DL representation of turbulent, reacting flow", Artificial Intelligence for Robust Engineering & Science, AIRES 2: Machine Learning for Robust Digital Twins, January 19 – 21, 2021.

David P. Schmidt, Invited Presentation, "How the Experimentalists Launched a Revolution in Spray Modeling," University of Cincinnati Mechanical Engineering Department, September 2020.

David P. Schmidt, Keynote Address, "New Horizons in Energy Technology With CONVERGE," Converge User Conference, Madison, WI, October 2018.

David P. Schmidt, "Topic 9: Internal Gasoline Direct Injection," Engine Combustion Network, Valencia, Spain, 2018.

David P. Schmidt, "Simulations of Flash Boiling Fuel Injection Using the Homogenous Relaxation Model," 19th Annual Internal Combustion Engine (ICE) Workshop hosted by Siemens Inc., Dearborn MI, May 2018.

David P. Schmidt, "Employment of Advanced Diagnostics in Internal Combustion Engines" Invited panel, SAE World Congress and Exposition, 2018.

David P. Schmidt, "ECN 5 Topic 8: Internal and Near Nozzle Flow Modeling Spray G," Engine Combustion Network Workshop, Detroit, MI, May 2017.

David P. Schmidt, "Validation of Internal Fuel Injector Flash Boiling and a Theory of Lagrangian/Eulerian Convergence as Demonstrated by STAR-CCM+," 18th Annual Internal Combustion Engine (ICE) Workshop hosted by Siemens Inc., Dearborn MI, May 2017.

David P. Schmidt, "Panel Discussion: Internal Flow of Automotive Injectors," ILASS Meeting, Dearborn, MI, 2016.

David P. Schmidt, "Understanding Anomalous Behavior in GDI Sprays Using CFD", 17th Annual Internal Combustion Engine (ICE) Workshop hosted by CD Adapco, Dearborn MI, 2016.

David P. Schmidt, "Detailed Simulation of Flash-boiling Fuel Injection", 16th Annual Internal Combustion Engine (ICE) Workshop, Dearborn MI, 2015.

David P. Schmidt, "Internal Flow Modeling Presentation," 3rd Engine Combustion Network Workshop, Ann Arbor, MI, 2014.

David P. Schmidt, "Multiphase CFD Research at UMass," RWTH Aachen, seminar, 2013.

David P. Schmidt, "The Philosophy and Practice of Multiphase CFD Research with OpenFOAM," keynote address, 1st New England OpenFOAM Workshop, June 2013.

David P. Schmidt, "Eulerian Modeling of High Reynolds, High Weber Number Two-Phase Flow," ASME FED Conference, Puerto Rico, 2012.

David P. Schmidt, "Flash- Boiling Channel Flow," ASME FED Conference, Puerto Rico, 2012.

David P. Schmidt, "Multi-scale Challenges in Multi-phase CFD," keynote speaker, Open Source CFD International Conference 2010, Munich, November, 2010.

David P. Schmidt, "Collision simulation of gelled hypergolic propellants," International Workshop on Numerical Methods in Non-Newtonian Fluid Dynamics, Northampton, MA, June, 2010.

David P. Schmidt, "Multiphase CFD Research With OpenFOAM," invited presentation, Institute for High Performance Computing, Singapore, December, 2009.

David P. Schmidt, "Engine Technologies: The Road Ahead," Embracing the Green Revolution: Impacts on the Transportation Profession, University of Massachusetts, Amherst, May 2008.

David P. Schmidt, "Recent Advances in Modeling Sprays in Crossflow," UTRC Workshop on Advancements in Modeling and Experimental Characterization of Atomization Processes, June 2007.

David P. Schmidt, "Numerical Methods for Two-Phase Flows," Institute for Advanced Studies, Bologna, March, 2007.

David P. Schmidt, "Recent Advances in the Modeling of Direct Injection," Ferrari Corporation, Italy, December, 2006.

David P. Schmidt, “A Ranking of Recent Advances in Modeling Direct Injection”, plenary speaker at “ICE&V Workshop on Control, Simulation and Modelling of Engine and Vehicles,” Naples, December, 2006.

David P. Schmidt, “Numerical Methods for Two Phase Flow Simulation,” University of Bologna, Bologna, October, 2006.

David P. Schmidt, “Numerical Methods and Algorithms for Two Phase Flow Simulation,” University of Rome Tor Vergata, Rome, September, 2006.

David P. Schmidt, panel discussion on Contributions of Spray Research to the Design Process,” ILASS Conference, Toronto, April 2006.

David P. Schmidt, “Simulating the Dense Spray Core,” WPI, March 2006.

David P. Schmidt, “Simulation of Atomization,” Chemical Engineering Seminar, UMass, Amherst, 2003.

David P. Schmidt, “Recent Advances in Spray Modeling for Combustion Applications,” Mechanical Engineering Seminar, UMass, Amherst, 2002.