Nicholas T. Wimer, Ph.D.

Expert Witness and Computational Research Scientist
Burns & Wimer Consulting, LLC
National Laboratory of the Rockies
Redlands, CA

Nicholas@burnswimerconsulting.com
Google Scholar | ORCID
LinkedIn | Burns & Wimer Consulting

Summary

Dr. Wimer is an award-winning computational scientist, software developer, and mentor specializing in fluid dynamics and numerical methods. As co-founder of Burns & Wimer Consulting, he provides expert analysis and litigation support in hydrology and hydraulics, including investigations of flooding, water-driven landslides, groundwater flow, and stormwater, sewer, and water-distribution infrastructure. His work combines historical storm analysis, computational modeling, and scientific visualization, drawing on scientific data across disciplines to reconstruct events and investigate their physical causes. His research at the National Laboratory of the Rockies spans numerical modeling, scientific machine learning, and uncertainty quantification, including the development of computational methods and software for applications in combustion, materials, and energy systems.

Education

2013–2019 **Ph.D. Mechanical Engineering**, *Computational Fluid Dynamics*, University of Colorado Boulder, Boulder, CO
Thesis: "High-Resolution Numerical Simulations of Buoyancy-Driven Flows" (2019) Department of Mechanical Engineering, University of Colorado Boulder.

2013–2017 **M.S. Mechanical Engineering**, *University of Colorado Boulder*, Boulder, CO

2012–2013 **B.E. Mechanical Engineering**, *Thayer School of Engineering*, Dartmouth College, Hanover, NH

2008–2012 **A.B. Engineering-Physics**, *Dartmouth College*, Hanover, NH, Minor: Art History
Honors: 2009-2010 Wilder Undergraduate Research Fellow, Department of Physics and Astronomy.

Professional Experience

2024–current **Burns & Wimer Consulting, LLC**, *Expert Witness and Principal Engineer*, Redlands, CA

2026–current **Advanced Engineering Software (AES)**, *Lead Software Developer*, Hydrologic engineering software, San Marcos, CA

2025–current **Tory R. Walker Engineering**, *Independent Hydrology Consultant*, Vista, CA

2019–current **National Laboratory of the Rockies (formerly NREL)**, Golden, CO
- *Computational Scientist*, Scalable Algorithms, Modeling, and Simulations 2025–current
- *Computational Scientist*, High-Performance Algorithms and Complex Fluids 2022–2025
- *Postdoctoral Researcher*, High-Performance Algorithms and Complex Fluids 2019–2022

2021–2025 **Hromadka & Associates**, *Hydrological Analysis and Software Development*, Rancho Santa Margarita, CA
- *Senior Engineering Consultant* 2023–2025
- *Independent Consultant* 2021–2023

2014–2017 **3M**, Research Consultant in Industrial Fluid Dynamics Systems, University of Colorado, Boulder, Boulder, CO

2013–2014 **National Renewable Energy Laboratory**, *National Wind Technology Center*, Research Assistant, Boulder, CO

Litigation Consulting Experience

Practice Hydrologic and hydraulic analysis and computational modeling for litigation involving precipitation events, surface runoff, flooding, groundwater movement, landslide causation, and stormwater, sewer, and water-distribution infrastructure.

Role Designated expert, Burns & Wimer Consulting, LLC (2024–present); consulting expert supporting designated experts, Hromadka & Associates (2021–2025) and Tory R. Walker Engineering (2025–present).

Methods Historical storm and precipitation reconstruction; rainfall–runoff and hydraulic modeling; surface-water and groundwater flow analysis; statistical analysis of hydrologic records; scientific visualization of events and causation.

Work product Causation analyses, technical memoranda, modeling results, and figures and exhibits for retaining counsel and designated experts.

Matters 26 litigation matters (2021–present): designated expert on 8; technical analysis supporting the designated expert on 18. Subject areas include flooding, surface runoff, landslide causation, groundwater, and water infrastructure.

Publications

Citations **All time:** 431 citations; h-index 13; i10-index 16.
Since 2021: 353 citations; h-index 12; i10-index 14.
Google Scholar, updated: 12 November 2026.

Peer-Reviewed Journal Publications (N. T. Wimer:*, Corresponding author:†)

[1] J. Gafur, M. Milkert, K. P. Griffin, N. T. Wimer*, C. Tripp, and S. Goddard. Exploring the structure resulting from unstructured neural network pruning. *International Journal of Advanced Computer Science and Applications*, 17(6):25–34, 2026. DOI: 10.14569/IJACSA.2026.0170603.

[2] N. T. Wimer*†, J. Mueller, S. Hamel, and V. Lordi†. Benchmarking the performance of uncertainty quantification methods for neural network-based interatomic potentials. *Journal of Cheminformatics*, 18:67, 2026. Supplementary material: Figshare collection; additional file. DOI: 10.1186/s13321-026-01193-7.

[3] C. J. Balos, M. Day, L. Esclapez, A. M. Felden, D. J. Gardner, M. Hassanaly, D. R. Reynolds, J. S. Rood, J. M. Sexton, N. T. Wimer*, and C. S. Woodward. SUNDIALS time integrators for exascale applications with many independent systems of ordinary differential equations. *The International Journal of High Performance Computing Applications*, 39(1):123–146, 2025. DOI: 10.1177/10943420241280060.

[4] S. Yellapantula, N. T. Wimer*, M. T. Henry de Frahan, S. N. Appukuttan, M. J. Martin, B. A. Perry, H. Sitaraman, M. Rahimi, and M. Day. Accelerating innovative energy solutions using combustion simulations. *Computing in Science & Engineering*, 27(1):9–17, 2025. DOI: 10.1109/MCSE.2025.3556567.

[5] M. Hassanaly, N. T. Wimer*, A. Felden, L. Esclapez, J. Ream, M. T. Henry de Frahan, J. Rood, and M. Day. Symbolic construction of the chemical Jacobian of quasi-steady state (QSS) chemistries for exascale computing platforms. *Combustion and Flame*, 270:113740, 2024. DOI: 10.1016/j.combustflame.2024.113740.

[6] N. T. Wimer*†, L. Esclapez, N. Brunhart-Lupo, M. T. Henry de Frahan, M. Rahimi, M. Hassanaly, J. Rood, S. Yellapantula, H. Sitaraman, B. Perry, M. Martin, O. Doronina, S. N. Appukuttan, M. Rieth, and M. Day. Visualizations of a methane/diesel RCCI engine using PeleC and PeleLMeX. *Phys. Rev. Fluids*, 8(11):110511, Nov 2023. DOI: 10.1103/PhysRevFluids.8.110511.

[7] L. Esclapez, M. Day, J. Bell, A. Felden, C. Gilet, R. Grout, M. Henry de Frahan, E. Motheau, A. Nonaka, L. Owen, B. Perry, J. Rood, N. T. Wimer*, and W. Zhang. PeleLMeX: an AMR low

mach number reactive flow simulation code without level sub-cycling. *Journal of Open Source Software*, 8(90):5450, 2023. DOI: 10.21105/joss.05450.

[8] N. T. Wimer*†, M. T. Henry de Frahan, and S. Yellapantula. Deep reinforcement learning to discover multi-fuel injection strategies for compression ignition engines. *International Journal of Engine Research*, 24(9):3985–4007, 2023. DOI: 10.1177/14680874231184002.

[9] M. T. Henry de Frahan†, N. T. Wimer*, S. Yellapantula, and R. W. Grout. Deep reinforcement learning for dynamic control of fuel injection timing in multi-pulse compression ignition engines. *International Journal of Engine Research*, 23(9):1503–1521, 2022. DOI: 10.1177/14680874211019345.

[10] M. A. Meehan, N. T. Wimer*, and P. E. Hamlington†. Richardson and Reynolds number effects on the near field of buoyant plumes: temporal variability and puffing. *Journal of Fluid Mechanics*, 950:A24, 2022. DOI: 10.1017/jfm.2022.788.

[11] J. D. Christopher, O. A. Doronina, D. Petrykowski, T. R. S. Hayden, C. Lapointe, N. T. Wimer*, I. Grooms, G. B. Rieker, and P. E. Hamlington†. Flow parameter estimation using laser absorption spectroscopy and approximate Bayesian computation. *Experiments in Fluids*, 62:43, 2021. DOI: 10.1007/s00348-020-03122-2.

[12] C. Lapointe, N. T. Wimer*, S. Simons-Wellin, J. F. Glusman, G. B. Rieker, and P. E. Hamlington†. Efficient simulations of propagating flames and fire suppression optimization using adaptive mesh refinement. *Fluids*, 6(9):323, 2021. DOI: 10.3390/fluids6090323.

[13] N. T. Wimer*, M. S. Day, C. Lapointe, M. A. Meehan, A. S. Makowiecki, J. F. Glusman, J. W. Daily, G. B. Rieker, and P. E. Hamlington†. Numerical simulations of buoyancy-driven flows using adaptive mesh refinement: Structure and dynamics of a large-scale helium plume. *Theoretical and Computational Fluid Dynamics*, 35:61–91, 2021. DOI: 10.1007/s00162-020-00548-6.

[14] T. R. S. Hayden, N. T. Wimer*, C. Lapointe, J. D. Christopher, S. P. Nigam, A. Upadhye, M. A. Strobel, P. E. Hamlington, and G. B. Rieker†. Characterization of the buoyant jet above a catalytic combustor using wavelength modulation spectroscopy. *Combustion Science and Technology*, 192(6):997–1014, 2020. DOI: 10.1080/00102202.2019.1604518.

[15] C. Lapointe, N. T. Wimer*, J. F. Glusman, A. S. Makowiecki, J. W. Daily, G. B. Rieker, and P. E. Hamlington†. Efficient simulation of turbulent diffusion flames in OpenFOAM using adaptive mesh refinement. *Fire Safety Journal*, 111:102934, 2020. DOI: 10.1016/j.firesaf.2019.102934.

[16] A. S. Makowiecki, J. E. Steinbrenner, N. T. Wimer*, J. F. Glusman, C. B. Lapointe, J. W. Daily, P. E. Hamlington, and G. B. Rieker†. Dual frequency comb spectroscopy of solid fuel pyrolysis and combustion: Quantifying the influence of moisture content in Douglas fir. *Fire Safety Journal*, 116:103185, 2020. DOI: 10.1016/j.firesaf.2020.103185.

[17] N. T. Wimer*, C. Lapointe, J. D. Christopher, S. P. Nigam, T. R. S. Hayden, A. Upadhye, M. Strobel, G. B. Rieker, and P. E. Hamlington†. Scaling of the puffing Strouhal number for buoyant jets and plumes. *Journal of Fluid Mechanics*, 895:A26, 2020. DOI: 10.1017/jfm.2020.271.

[18] J. F. Glusman†, K. E. Niemeyer, A. S. Makowiecki, N. T. Wimer*, C. Lapointe, G. B. Rieker, P. E. Hamlington, and J. W. Daily. Reduced gas-phase kinetic models for burning of Douglas Fir. *Frontiers in Mechanical Engineering*, 5:40, 2019. DOI: 10.3389/fmech.2019.00040.

[19] T. R. S. Hayden, N. Malarich, D. Petrykowski, S. Nigam, J. D. Christopher, C. Lapointe, N. T. Wimer*, P. E. Hamlington, and G. B. Rieker†. OH radical measurements in combustion environments using wavelength modulation spectroscopy and dual frequency comb spectroscopy near 1491 nm. *Applied Physics B*, 125:226, 2019. DOI: 10.1007/s00340-019-7341-6.

[20] T. R. S. Hayden†, D. J. Petrykowski, A. Sanchez, S. P. Nigam, C. Lapointe, J. D. Christopher, N. T. Wimer*, A. Upadhye, M. Strobel, P. E. Hamlington, and G. B. Rieker. Characterization of OH, H_2O, and temperature profiles in industrial flame treatment systems interacting with polymer

films. *Proceedings of the Combustion Institute*, 37(2):1571–1578, 2019. DOI: 10.1016/j.proci.2018.05.058.

[21] J. D. Christopher†, N. T. Wimer*, C. Lapointe, T. R. S. Hayden, I. Grooms, G. B. Rieker, and P. E. Hamlington. Parameter estimation for complex thermal-fluid flows using approximate Bayesian computation. *Physical Review Fluids*, 3:104602, 2018. DOI: 10.1103/PhysRevFluids.3.104602.

[22] R. E. Denton†, K. Takahashi, J. Lee, C. K. Zeitler, N. T. Wimer*, L. E. Litscher, H. J. Singer, and K. Min. Field line distribution of mass density at geostationary orbit. *J. Geophys. Res. Space Physics*, 120(6):4409–4422, 2015. DOI: 10.1002/2014JA020810.

Peer-Reviewed Conference Papers

[23] Marc T. Henry de Frahan, Lucas Esclapez, Jon Rood, Nicholas T. Wimer*, Paul Mullowney, Bruce A. Perry, Landon Owen, Hariswaran Sitaraman, Shashank Yellapantula, Malik Hassanaly, Mohammad J. Rahimi, Michael J. Martin, Olga A. Doronina, Sreejith N. A., Martin Rieth, Wenjun Ge, Ramanan Sankaran, Ann S. Almgren, Weiqun Zhang, John B. Bell, Ray Grout, Marc S. Day, and Jacqueline H. Chen. The Pele simulation suite for reacting flows at exascale. In *Proceedings of the 2024 SIAM Conference on Parallel Processing for Scientific Computing (PP)*, pages 13–25. Society for Industrial and Applied Mathematics, February 2024. DOI: 10.1137/1.9781611977967.2.

[24] N. T. Wimer*, L. Esclapez, M. Henry de Frahan, M. Rahimi, M. Hassanaly, B. Perry, J. Rood, S. Yellapantula, H. Sitaraman, M. Martin, O. Doronina, S. N. Appukuttan, M. Rieth, and M. Day. Examination of a methane/diesel RCCI engine using Pele. *Proceedings of the 13th U.S. National Meeting on Combustion*, 2023.

[25] C. Lapointe, N. T. Wimer*, J. F. Glusman, A. S. Makowiecki, J. W. Daily, G. B. Rieker, and P. E. Hamlington. Progress towards high fidelity simulations of large-scale fires. *Proceedings of the 11th U.S. National Meeting on Combustion*, 2019.

[26] A. S. Makowiecki, N. T. Wimer*, J. F. Glusman, J. W. Daily, P. E. Hamlington, and G. B. Rieker. Comparison of flame temperatures to mass flux rates for wildland fire fuels. *Proceedings of the 11th U.S. National Meeting on Combustion*, 2019.

[27] M. Meehan, N. T. Wimer*, A. Tyagi, J. A. O'Connor, and P. Hamlington. Identifying complex dynamics of interacting turbulent jets through modal decompositions. In *AIAA Scitech 2019 Forum*, page 0323, 2019. DOI: 10.2514/6.2019-0323.

[28] J. D. Christopher†, D. Petrykowski, T. R. S. Hayden, C. Lapointe, N. T. Wimer*, S. Nigam, I. Grooms, P. E. Hamlington, and G. B. Rieker. Parameter estimation using wavelength modulation spectroscopy temperature measurements and approximate bayesian computation. *In Light, Energy and the Environment*, 2018. DOI: 10.1364/EE.2018.EM3A.5.

[29] J.F. Glusman†, A.S. Makowiecki, N. T. Wimer*, K.E. Niemeyer, G.B. Rieker, P.E. Hamlington, and J.W. Daily. A Chemical Kinetic Model Reduction and Pyrolysis Model for Wildland Fire Direct Numerical Simulation. *Proceedings of the 2018 Western States Section of the Combustion Institute Spring Technical Meeting*, Paper ID: 38CK-0010, 2018.

[30] J. Christopher†, C. Lapointe, N. T. Wimer*, T. Hayden, I. Grooms, G. Rieker, and P. Hamlington. Parameter Estimation for a Turbulent Buoyant Jet using Approximate Bayesian Computation. *AIAA Paper*, AIAA-2017-0531, 2017. DOI: 10.2514/6.2017-0531.

[31] J.D. Christopher†, C. Lapointe, N. T. Wimer*, T.R.S. Hayden, I. Grooms, G.B. Rieker, and P.E. Hamlington. Parameter Estimation for a Turbulent Buoyant Jet with Rotating Cylinder Using Approximate Bayesian Computation. *AIAA Paper*, AIAA-2017-3629, 2017. DOI: 10.2514/6.2017-3629.

[32] T. Hayden†, N. T. Wimer*, C. Lapointe, J. Christopher, P.E. Hamlington, and G. Rieker. Characterization of a Jet Above a Catalytic Combustor Using Wavelength Modulation Spectroscopy. *Proceedings of the 10th U.S. National Meeting on Combustion*, 2017.

[33] T. Hayden†, N. T. Wimer*, C. Lapointe, J. Christopher, A. Makowiecki, P.E. Hamlington, and G. Rieker. Characterization of the Output from a Catalytic Combustor Using Wavelength Modulation Spectroscopy. *AIAA Paper*, AIAA-2017-4424, 2017. DOI: 10.2514/6.2017-4424.

[34] Torrey Hayden†, Nicholas T. Wimer*, Caelan LaPointe, Jason Christopher, Siddharth Nigam, Peter Hamlington, and Gregory B. Rieker. Wavelength Modulation Spectroscopy of OH Radical in an Industrial Flame. *Light, Energy and the Environment, OSA Technical Digest (online) (Optical Society of America, 2017)*, Paper ETh2A.4, 2017. DOI: 10.1364/EE.2017.ETh2A.4.

[35] C. Lapointe†, J.D. Christopher, N. T. Wimer*, T.R.S. Hayden, G.B. Rieker, and P.E. Hamlington. Optimization for Internal Turbulent Compressible Flows Using Adjoints. *AIAA Paper*, AIAA-2017-4115, 2017. DOI: 10.2514/6.2017-4115.

[36] N. T. Wimer*†, C. Lapointe, T.R.S. Hayden, J.D. Christopher, A.Y. Poludnenko, G.B. Rieker, and P.E. Hamlington. Near- and Far-Field Properties of High-Temperature Turbulent Buoyant Jets. *AIAA Paper*, AIAA-2017-4423, 2017. DOI: 10.2514/6.2017-4423.

[37] N. T. Wimer*†, A.S. Makowiecki, A.Y. Poludnenko, C.M. Hoffman, J.W. Daily, G.B. Rieker, and P.E. Hamlington. Direct Numerical Simulation of Wildland Fires at Small Scales. *Proceedings of the 2017 Western States Section of the Combustion Institute Fall Technical Meeting*, Paper ID: 29FI-0079, 2017.

Published Reports

[38] N. T. Wimer*. Fire resistance development for UL 790 burning brand test: Cooperative research and development final report, CRADA number CRD-21-18394. Technical Report NREL/TP-2C00-94177, National Renewable Energy Laboratory, 2025. DOI: 10.2172/2583501.

[39] P. E. Hamlington, J. W. Daily, G. B. Rieker, J. Farnsworth, H. Hannigan, H. Michelsen, S. Coburn, C. Lapointe, C. Callahan, J. Glusman, E. Kolb, A. Makowiecki, P. Sardana, S. Sheppard, S. Simons-Wellin, N. T. Wimer*, T. Breda, A. Dawlatzai, C. Kling, A. Y. Poludnenko, and C. M. Hoffman. Examination of wildland fire spread at small scales using direct numerical simulations and frequency comb laser diagnostics. Technical Report/Final Report AD1189875, University of Colorado and Texas A&M University, June 2021. Approved for public release; distribution is unlimited. Funding organization: Strategic Environmental Research and Development Program, Alexandria, VA.

[40] Nicholas T Wimer. *High-Resolution Numerical Simulations of Buoyancy-Driven Flows*. PhD thesis, University of Colorado at Boulder, 2019.

Invited Talks and Panels

[P.1] N. T. Wimer. Updates to AES for the 2026 San Bernardino Hydrology Manual. APWA Inland Empire, San Bernardino County Hydrology Manual Workshop. Fontana Heritage Center, Fontana, CA. November 5, 2026.

[P.2] Uncertainty Quantification for Machine-Learned Interatomic Potentials. Invited panel with Jenna Pope. Physics Inverted Materials (PHIN). Virtual. June 9, 2026.

[P.3] Artificial Intelligence at the Department of Energy. "Towards a Wildfire Resilient Electrical Grid: Resiliency to and Recovery from Natural & Manmade Disasters." Department of Energy (DOE), Virtual. January 12, 2022.

[P.4] Artificial Intelligence Bias in Clean Energy. National Renewable Energy Laboratory. (Virtual) Golden, CO. November 10, 2021.

Presentations

Conference Presentations: Abstract Only

[P.1] N. T. Wimer, J. A. Ream, J. Mueller, J. D. Tibocha-Bonilla, M. J. Rahimi, W. T. Cordell, H. Sitaraman, M. Day, D. Salvachua. (2025) Evaluation of Reaction Models in CFD Simulations of P. Putida Pilot-Scale Bioreactors. 78th Annual Division of Fluid Dynamics, American Physical Society, 24 November 2025, Houston TX.

[P.2] J. A. Ream, N. T. Wimer, M. J. Rahimi, W. T. Cordell, J. D. Tibocha-Bonilla, J. Mueller, H. Sitaraman, M. Day, D. Salvachua. (2025) Scale-down for scale-up: using CFD to investigate microenvironment conditions and inform experimental design. 78th Annual Division of Fluid Dynamics, American Physical Society, 24 November 2025, Houston TX.

[P.3] N. T. Wimer, J. Mueller, S. Hamel, V. Lordi. (2025) Examining Uncertainty Quantification Techniques for Machine Learned Interatomic Potentials. Global Physics Summit, American Physical Society, 18 March 2025, Anaheim, CA.

[P.4] J. Ream, N. T. Wimer, M. Rahimi, W. Cordell, H. Sitaraman, M. Day, D. Salvachua. (2024) Examining the Impact of Microenvironments on Large-Scale Bioreactor Processes. 77th Annual Division of Fluid Dynamics, American Physical Society, November 2024, Salt Lake City, UT.

[P.5] N. T. Wimer, R. Fisher, M. Day. (2024) Extending the Pele Suite through Python and pyAMReX. 77th Annual Division of Fluid Dynamics, American Physical Society, 25 November 2024, Salt Lake City, UT.

[P.6] M. Rahimi, J. Ream, N. T. Wimer, H. Sitaraman, M. Day, D. Salvachua. (2024) Multiphase Simulation of Bioreactors to Improve Biofuel Production at Scale. AIChE Annual Meeting, San Diego, CA.

[P.7] J. Ream, M. Rahimi, N. T. Wimer, W. Cordell, H. Sitaraman, M. Day, D. Salvachua. (2024) Computational Fluid Dynamics for Microenvironment Development in Bioreactors. Rocky Mountain Fluid Mechanics Research Symposium, 6 August 2024, Boulder, CO.

[P.8] M. Day, N. T. Wimer, M. Hassanaly, L. Esclapez, A. Felden, J. Ream, M. T. Henry de Frahan, J. Rood. (2024) Multiphysics time-integration for turbulent combustion at the exascale. SIAM Annual Meeting, 11 July 2024, Spokane, WA.

[P.9] N. T. Wimer. (2024) Comparison of Uncertainty Quantification Methods for Scientific Machine Learning. AIRES 5, Pacific Northwest National Laboratory, Richland, WA, 22 May 2024. One-hour presentation in the tutorial session.

[P.10] M. Day, M. T. Henry de Frahan, J. Rood, N. T. Wimer, B. Perry, H. Sitaraman, S. Yellapantula, L. Esclapez, S. Appukuttan. (2023) Adaptive Mesh Refinement Simulations for Turbulent Reacting Flow. SIAM Conference on Computational Science and Engineering, March 2023, Amsterdam, Netherlands.

[P.11] N. T. Wimer, M. Hassanaly, L. Esclapez, A. Felden, J. A. Ream, M. T. Henry de Frahan, J. Rood, M. Day. (2023) Accelerating Exascale Reacting Flow Simulations with a Symbolic Analytic Jacobian formulation for QSSA Mechanisms. 76th Annual Division of Fluid Dynamics, American Physical Society, 19 November 2023, Washington, DC.

[P.12] P. E. Hamlington, M. Meehan, N. T. Wimer. (2023) Resolution Requirements for Numerical Simulations of Buoyant Plumes. 76th Annual Division of Fluid Dynamics, American Physical Society, 19 November 2023, Washington, DC.

[P.13] C. Tripp, A. Nag, S. Zisman, J. Perr-Sauer, J. Gafur, H. Egan, N. T. Wimer. (2023) Decision Points and Practical Considerations for AI Projects. VERGE 23, 24–26 October 2023, San Jose, CA.

[P.14] N. T. Wimer, L. Esclapez, M. Henry de Frahan, M. Rahimi, M. Hassanaly, B. Perry, J. Rood, S. Yellapantula, H. Sitaraman, M. Martin, O. Doronina, S. N. Appukuttan, M. Rieth, and M. Day. (2023) Examination of a Methane/Diesel RCCI Engine using Pele. 13th Annual U.S. National Meeting on Combustion, College Station, TX.

[P.15] C. Tripp, H. Egan, E. Bensen, J. Perr-Sauer, N. T. Wimer, A. Nag, S. Zisman, J. Gafur (2023) Green Computing Opportunities & Strategy. Joint Institute for Strategic Energy Analysis, 26 April 2023, Golden, CO.

[P.16] N. T. Wimer, M. Henry de Frahan, S. Yellapantula, R. Grout, S. Kiyabu (2022) Machine Learning for Combustion System Control and Simulation. 75th Annual Division of Fluid Dynamics, American Physical Society, 20 November 2022, Indianapolis, IN.

[P.17] M. Day, L. Esclapez, M. Henry de Frahan, J. Rood, H. Sitaraman, N. T. Wimer, R. Grout, J. Chen (2022) Pele: An Exascale-Ready Suite of Combustion Codes. 18th Numerical Conference, 11 May 2022, San Diego, CA.

[P.18] P. E. Hamlington, C. B. Lapointe, M. Meehan, S. Simons-Wellin, N. T. Wimer, and J. F. Glusman (2022) High-Fidelity Numerical Simulations of Fire Using Adaptive Mesh Refinement. APS March Meeting 2022, March 17, 2022, Chicago, IL.

[P.19] N. T. Wimer and T. Hromadka (2021) Modernizing the Diffusion Hydrodynamic Model. ARL-USMA Technical Symposium, October 22, 2021, (Virtual) West Point, West Point, NY.

[P.20] S. Kiyabu and N. T. Wimer (2021) Modeling Combustion Reaction ODEs with Neural Networks. Rocky Mountain Fluid Mechanics Research Symposium, 10 August 2021, (Virtual) Boulder, CO.

[P.21] N. T. Wimer, M. Henry de Frahan, S. Yellapantula, R. W. Grout, and M. Day (2021) Deep Reinforcement Learning to Discover Multi-fuel Injection Strategies for Compression Ignition Engines. 74th Annual Division of Fluid Dynamics, American Physical Society, 21 November 2021, (Virtual) Phoenix, AZ.

[P.22] N. T. Wimer, M. Henry de Frahan, S. Yellapantula, R. W. Grout, and M. S. Day (2021) Reinforcement Learning for Advanced Combustion. Advanced Engine Crosscut Meeting. November 4, 2021, (Virtual).

[P.23] N. T. Wimer, M. Henry de Frahan, S. Yellapantula, and R. W. Grout (2021) Discovering multi-fuel injection strategies for compression ignition engines through deep reinforcement learning. AEC Program Review, February, 2021, (Virtual).

[P.24] N. T. Wimer, M. Henry de Frahan, S. Yellapantula, and R. Grout (2020) Deep Reinforcement Learning for Control of Fuel Injection in Compression Ignition Engines. 73rd Annual Division of Fluid Dynamics, American Physical Society, 22-24 November 2020, (Virtual) Chicago, IL.

[P.25] M. Meehan, N. T. Wimer, and P. E. Hamlington (2020) Effect of Reynolds Number on the Buoyant Jet Puffing Instability. 73rd Annual Division of Fluid Dynamics, American Physical Society, 22-24 November 2020, (Virtual) Chicago, IL.

[P.26] N. T. Wimer, M. Henry de Frahan, S. Yellapantula, and R. W. Grout (2020) Deep Reinforcement Learning for Control of Advanced Compression Ignition Engines. AEC Program Review, August 13, 2020, (Virtual).

[P.27] J. Glusman, K. Niemeyer, A. Makowiecki, N. T. Wimer, C. Lapointe, G. Rieker, P. Hamlington, J. Daily. (2019) Initial Verification of a Reduced Combustion Model of Douglas Fir. Rocky Mountain Fluid Mechanics Research Symposium, 29 July 2019, Boulder, CO.

[P.28] C. Lapointe, N. T. Wimer, J. Glusman, A. Makowiecki, J. Daily, G. Rieker, P. Hamlington. (2019) Efficient Simulation of Complex Fire Phenomena. Rocky Mountain Fluid Mechanics Research Symposium, 29 July 2019, Boulder, CO.

[P.29] C. Lapointe, N. T. Wimer*, M. S. Day, A. S. Makowiecki, J. F. Glusman, J. W. Daily, G. B. Rieker, and P. E. Hamlington (2019) The Study of Fire at Small Scales Using Adaptive Mesh Refinement. 17th International Conference on Numerical Combustion, SIAM, 6-8 May 2019, Aachen, Germany.

[P.30] C. Lapointe, N. T. Wimer*, J. F. Glusman, A. S. Makowiecki, J. W. Daily, G. B. Rieker, and P. E. Hamlington (2019) Progress Towards High Fidelity Simulations of Large-Scale Fires. 11th US National Combustion Meeting, 24-27 March 2019, Pasadena, CA.

[P.31] A. S. Makowiecki, N. T. Wimer*, J. F. Glusman, J. W. Daily, P. E. Hamlington, and G. B. Rieker(2019) Comparison of Flame Temperatures to Mass Flux Rates for Wildland Fire Fuels. 11th US National Combustion Meeting, 24-27 March 2019, Pasadena, CA.

[P.32] N. T. Wimer, M. S. Day, A. S. Makowiecki, J. F. Glusman, J. W. Daily, G. B. Rieker, P. E. Hamlington (2019) Direct Numerical Simulation of Buoyancy Driven Flows using PeleLM. SIAM Conference on Computational Science and Engineering, 25 February – 1 March 2019, Spokane, WA.

[P.33] C. Lapointe, N. T. Wimer, P. E. Hamlington (2018) Progress Towards Efficient Simulation of Large-Scale Fires. 71st Annual Division of Fluid Dynamics, American Physical Society, 18-20 November 2018, Atlanta, GA.

[P.34] N. T. Wimer, M. S. Day, A. S. Makowiecki, J. F. Glusman, J. W. Daily, G. B. Rieker, P. E. Hamlington (2018) Progress Towards Direct Numerical Simulations of Plumes and Pool Fires. 71st Annual Division of Fluid Dynamics, American Physical Society, 18-20 November 2018, Atlanta, GA.

[P.35] N. T. Wimer, M. S. Day, A. S. Makowiecki, J. F. Glusman, J. W. Daily, G. B. Rieker, P. E. Hamlington (2018) Direct Numerical Simulations of Plumes and Pool Fires Using Adaptive Mesh Refinement. Rocky Mountain Fluid Mechanics Research Symposium, 13 August 2018, Boulder, CO.

[P.36] C. Lapointe, N. T. Wimer, P. E. Hamlington (2018) Fire Simulation using Adaptive Mesh Refinement. Rocky Mountain Fluid Mechanics Research Symposium, 13–14 August 2018, Boulder, CO.

[P.37] J. F. Glusman, A. S. Makowiecki, N. T. Wimer, K. Niemeyer, G. B. Rieker, P. E. Hamlington, J. W. Daily (2018) A Chemical Kinetic Mechanism reduction for Wildland Fire Direct Numerical Simulation and Experimental Validation. Rocky Mountain Fluid Mechanics Research Symposium, 13–14 August 2018, Boulder, CO.

[P.38] A. S. Makowiecki, J. Steinbrenner, J. F. Glusman, N. T. Wimer, J. W. Daily, P. E. Hamlington, G. B. Rieker (2018) Dual Frequency Comb Spectroscopy for the investigation of Ignition Behaviour of Wildland Fire Fuels. Rocky Mountain Fluid Mechanics Research Symposium, 13–14 August 2018, Boulder, CO.

[P.39] P. E. Hamlington, C. Lapointe, N. T. Wimer, and M. S. Day (2018) Progress Towards Direct Numerical Simulation of Fire Using Adaptive Mesh Refinement. 10th FM Global Open Source CFD Fire Modeling Workshop, May 30-31, 2018, Norwood, MA.

[P.40] N. T. Wimer, A. S. Makowiecki, J. F. Glusman, A. Y. Poludnenko, C. Hoffman, J. W. Daily, G. B. Rieker, and P. E. Hamlington (2018) Direct Numerical Simulation of a Turbulent Helium Plume and Methane Pool Fire. The Fire Continuum Conference, 21-24 May 2018, Missoula, MT.

[P.41] N. T. Wimer, A. S. Makowiecki, A. Y. Poludnenko, C. Hoffman, J. W. Daily, G. B. Rieker, and P. E. Hamlington (2017) Examination of Wildland Fire Spread at Small Scales Using Direct Numerical Simulations and High-Speed Laser Diagnostics. American Geophysical Union Fall Meeting, 11-15 December 2017, New Orleans, LA.

[P.42] A. Makowiecki, N. T. Wimer, J. Daily, P. Hamlington, G. Rieker, C. Hoffman, and A. Poludnenko (2017) Examination of wildland fire spread at small scales using frequency comb laser diagnostics and direct numerical simulations. 7th International Fire Ecology & Management Congress, 28 November - 2 December, 2017, Orlando, FL.

[P.43] N. T. Wimer, A. S. Makowiecki, C. Hoffman, A. Poludnenko, J. W. Daily, G. B. Rieker, P. E. Hamlington (2017) Direct Numerical Simulation of Wildland Fires at Small Scales. 70th Annual meeting, Division of Fluid Dynamics, American Physical Society, Denver, CO, 19-21 November 2017.

[P.44] S. P. Nigam, C. Lapointe, J. D. Christopher, N. T. Wimer, T. R. S. Hayden, G. Rieker, P. Hamlington (2017) Flame Structure and Dynamics for an Array of Premixed Methane-Air Jets. 70th Annual meeting, Division of Fluid Dynamics, American Physical Society, Denver, CO, 19-21 November 2017.

[P.45] J. Christopher, N. T. Wimer, C. Lapointe, T. Hayden, I. Grooms, G. B. Rieker, P. E. Hamlington (2017) Parameter Estimation for a Pulsating Turbulent Buoyant Jet Using Approximate Bayesian Computation. 70th Annual meeting, Division of Fluid Dynamics, American Physical Society, Denver, CO, 19-21 November 2017.

[P.46] N. T. Wimer, A. S. Makowiecki, J. W. Daily, G. B. Rieker, P. E. Hamlington (2017) Direct Numerical Simulation of Wildland Fires at Small Scales. Rocky Mountain Fluid Mechanics Symposium, 11 August 2017, Boulder, CO.

[P.47] S. Nigam, C. Lapointe, J. Christopher, N. T. Wimer, T. Hayden, I. Grooms, G. B. Rieker, P. E. Hamlington (2017) Sensitivity Analysis for an Open Catalytic Burner. Rocky Mountain Fluid Mechanics Symposium, 11 August 2017, Boulder, CO.

[P.48] J. D. Christopher, C. Lapointe, N. T. Wimer, T. R. S. Hayden, S. Nigam, I. Grooms, G. B. Rieker, P. E. Hamlington (2017) Inlet Field Quantity Estimation for a Turbulent Buoyant Jet Using Approximate Bayesian Computation. Rocky Mountain Fluid Mechanics Symposium, 11 August 2017, Boulder, CO.

[P.49] J. Christopher, N. T. Wimer, T. Hayden, C. Lapointe, I. Grooms, G. Rieker, and P. Hamlington (2016) Parameter Estimation for a Turbulent Buoyant Jet Using Approximate Bayesian Computation. 69th Annual meeting, Division of Fluid Dynamics, American Physical Society, Portland, OR, 20-22 November 2016.

[P.50] C. Lapointe, N. T. Wimer, T. Hayden, J. Christopher, G. Rieker, and P. Hamlington (2016) Scaling Analysis of Temperature Variability Between a Rotating Cylinder and a Turbulent Buoyant Jet. 69th Annual meeting, Division of Fluid Dynamics, American Physical Society, Portland, OR, 20-22 November 2016.

[P.51] N. T. Wimer, C. Lapointe, T. Hayden, J. Christopher, G. Rieker, and P. Hamlington (2016) Effects of Exit Variability on Near-Field Statistics for Turbulent Buoyant Jets. 69th Annual meeting, Division of Fluid Dynamics, American Physical Society, Portland, OR, 20-22 November 2016.

[P.52] T. R. S. Hayden, N. T. Wimer, C. Lapointe, J. D. Christopher, P. E. Hamlington, G. B. Rieker (2016) Characterization of Catalytic Combustion in Film Processing Using Wavelength Modulation Spectroscopy. Rocky Mountain Fluid Mechanics Symposium, 9 August 2016, Boulder, CO.

[P.53] J. D. Christopher, N. T. Wimer, T. R. S. Hayden, C. Lapointe, I. Grooms, G. B. Rieker, P. E. Hamlington (2016) Parameter Estimation for a Turbulent Buoyant Jet Using Approximate Bayesian Computation. Rocky Mountain Fluid Mechanics Symposium, 9 August 2016, Boulder, CO.

[P.54] N. T. Wimer, C. Lapointe, P. E. Hamlington (2016) Effects of Inlet Uniformity on Downstream Statistics for Forced Buoyant Plumes. Rocky Mountain Fluid Mechanics Symposium, 9 August 2016, Boulder, CO.

[P.55] C. Lapointe, N. T. Wimer, P. E. Hamlington (2016) Turbulent Couette Flow in OpenFOAM. Rocky Mountain Fluid Mechanics Symposium, 9 August 2016, Boulder, CO.

[P.56] N. T. Wimer, M. Churchfield, and P. E. Hamlington (2014) Effects of Offshore Wind Turbines on Ocean Waves. 67th Annual meeting, Division of Fluid Dynamics, American Physical Society, San Francisco, CA, 23-25 November 2014.

[P.57] R. E. Denton, C. K. Zeitler, J. Amoh, H. Yang, K. Takahashi, M. F. Thomsen, R. R. Anderson, B. W. Reinisch, H. J. Singer, P. M. Tengdin, J. Huo, S. Taka, N. T. Wimer, and L. E. Litscher. (2011) Density, composition, and field line dependence of bulk plasma at geosynchronous orbit versus local time, season, and solar cycle phase. American Geophysical Union Fall Meeting, abstract SM33A-2147.

Conference Posters

[P.58] J. Ream, N. T. Wimer, M. J. Rahimi, W. T. Cordell, H. Sitaraman, M. Day, D. Salvachúa. (2025) Incorporating data-informed models to investigate the impact of bioreactor microenvironments. Global Physics Summit, American Physical Society, 18 March 2025, Anaheim, CA. Poster presented by Julia Ream.

[P.59] J. Chen, M. Day, R. Sankaran, S. Klippenstein, M. Arienti, M. Henry de Frahan, S. Desai, L. Esclapez, M. Hassanaly, W. Ge, B. Green, R. Grout, T. Lu, L. Owen, M. Rieth, J. Rood, M. Martin, S. N. Appukuttan, M. Rahimi, B. Soriano, N. T. Wimer, J. Wolfson-Pou, S. Yellapantula (2023) PELE-Transforming Combustion Science and Technology with Exascale Simulations. Exascale Computing Project Annual Meeting, 17 January 2023, Houston, TX.

[P.60] J. F. Glusman, A. S. Makowiecki, N. T. Wimer*, C. Lapointe, A. Y. Poludnenko, C. M. Hoffman, J. W. Daily, G. B. Rieker, and P. E. Hamlington (2018) Examination of Wildfire Spread at Small Scales Using Direct Numerical Simulations and Frequency Comb Laser Diagnostics. Strategic Environmental Research and Development Program (SERDP) and Environmental Security Technology Certification Program (ESTCP) Symposium, 27 November 2018, Washington, D.C.

[P.61] A. S. Makowiecki, J. E. Steinbrenner, J. F. Glusman, N. T. Wimer*, J. W. Daily, P. E. Hamlington, and G. B. Rieker (2018) Dual Frequency Comb Spectroscopy for the Investigation of Ignition Behaviour of Wildland Fire Fuels. Field Laser Applications in Industry and Research (FLAIR), Assisi, Italy, September 2018.

[P.62] N. T. Wimer*, C. Lapointe, M. S. Day, A. Y. Poludnenko, J. F. Glusman, A. S. Makowiecki, J. W. Daily, G. B. Rieker, and P. E. Hamlington (2018) Progress Towards Direct Numerical Simulations of Fire Using Adaptive Mesh Refinement. 37th International Symposium on Combustion, 29 July – 3 August 2018, Dublin, Ireland.

[P.63] A. S. Makowiecki, J. E. Steinbrenner, N. T. Wimer*, J. F. Glusman, J. W. Daily, P. E. Hamlington, G. B. Rieker (2018) Advanced Diagnostics Suite for Benchmark Data of Wildland Fire Fuels. Proceedings of the Combustion Institute. 30 July – 2 August 2018, Dublin, Ireland.

[P.64] J. F. Glusman, A. S. Makowiecki, N. T. Wimer*, K. Niemeyer, G. B. Rieker, P. E. Hamlington, and J. W. Daily (2018) Experimental Comparison of Small-Scale Biomass Pyrolysis and Reduced Chemical Kinetics Models for Direct Numerical Simulations of Wildland Fires. Proceedings of the Combustion Institute. 30 July – 2 August 2018, Dublin, Ireland.

[P.65] N. T. Wimer*, A. S. Makowiecki, J. F. Glusman, A. Y. Poludnenko, C. M. Hoffman, J. W. Daily, G. B. Rieker, and P. E. Hamlington (2017) Examination of Wildfire Spread at Small Scales

Using Direct Numerical Simulations and Frequency Comb Laser Diagnostics. Strategic Environmental Research and Development Program (SERDP) and Environmental Security Technology Certification Program (ESTCP) Symposium, 28-30 November 2017, Washington, D.C.

[P.66] A. S. Makowiecki, N. Hoghooghi, N. T. Wimer*, J. W. Daily, P. E. Hamlington, G. B. Rieker (2017) Cavity Enhanced Dual Frequency Comb Spectroscopy for Characterization of Biomass Pyrolysis. Gordon Research Conference: Laser Diagnostics in Combustion, 6-11 August 2017, West Dover, VT.

[P.67] N. T. Wimer*, A. S. Makowiecki, A. Y. Poludnenko, C. M. Hoffman, J. W. Daily, G. B. Rieker, and P. E. Hamlington (2017) Examination of Wildland Fire Spread at Small Scales Using Direct Numerical Simulations and Frequency Comb Laser Diagnostics. 12th International Symposium on Fire Safety Science, 12-16 June 2017, Lund, Sweden.

Video Submissions

[P.68] N. T. Wimer*, L. Esclapez, N. Brunhart-Lupo, M. Henry de Frahan, M. Rahimi, M. Hassanaly, J. Rood, S. Yellapantula, H. Sitaraman, B. Perry, M. Martin, O. Doronina, S. N. Appukuttan, M. Rieth, and M. Day (2022) Simulation of an RCCI Engine Using the Pele Suite of Exascale Codes. 75th Annual Meeting of the APS Division of Fluid Dynamics, November 20 – 22, 2022. DOI: https://doi.org/10.1103/APS.DFD.2022.GFM.V0076

[P.69] N. T. Wimer*, C. Lapointe, M. S. Day, A. Makowiecki, J. Glusman, J. Daily, G. Rieker, and P. E. Hamlington (2018) Numerical Simulations of Plume and Pool Fire Instabilities using Adaptive Mesh Refinement. Gallery of Fluid Motion. 71st Annual Meeting of the APS Division of Fluid Dynamics, November 18 – 20, 2018. DOI: https://doi.org/10.1103/APS.DFD.2018.GFM.V0083

Departmental Seminars and Lectures

[P.70] "Computational Engineering Mathematics: CFD Case Study." Four week mini-course for the Department of Mathematical Sciences at USMA West Point, West Point, NY, April 1 – April 30, 2021.

[P.71] "Deep reinforcement learning for control problems: Compression ignition engines." SciML/AI Seminar series @ NREL, National Renewable Energy Laboratory, (Virtual) Golden, CO, March 2021.

[P.72] "Learning Optimal Fuel Injection Strategies for Compression Ignition Engines." RL@NREL Seminar Series, National Renewable Energy Laboratory, Golden, CO, July 2020.

[P.73] "High Resolution Numerical Simulations of Buoyancy-Driven Flows." Boulder Fluid and Thermal Sciences Seminar Series, University of Colorado Boulder, Boulder, CO, 2 May 2019.

[P.74] "Large Eddy Simulation of Rectangular Turbulent Buoyant Jets for Industrial Applications." Boulder Fluid and Thermal Sciences Seminar Series, University of Colorado Boulder, Boulder, CO, September 2017.

[P.75] "Introduction to Open Channel Hydraulics." Introduction to Fluid Mechanics, Undergraduate Guest Lecturer. Thayer School of Engineering at Dartmouth College, Hanover, NH, Winter 2013.

Published Datasets

2026 **Public Reference Data for Megawatt-Scale Hydrogen Electrolysis – NLR Historical Wind**, *R. Abel, M. Schwarz, D. Leighton, K. Nagasawa, and N. T. Wimer*, National Laboratory of the Rockies
`https://doi.org/10.7799/3024096`

2025 **Public Reference Data for Megawatt-Scale Hydrogen Electrolysis – Simulated Wave**, *R. Abel, M. Schwarz, D. Leighton, V. Gevorgian, and N. T. Wimer*, National Renewable Energy Laboratory
`https://doi.org/10.7799/3007836`

2025 **Public Reference Data for Megawatt-Scale Hydrogen Electrolysis – Simulated Wind**, *R. Abel, M. Schwarz, D. Leighton, G. Starke, C. Bay, and N. T. Wimer*, National Renewable Energy Laboratory
`https://doi.org/10.7799/3007835`

Awards

2026 **R&D 100 Award**, *Pele Suite of Exascale Reacting Flow Codes*, Software/Services category
Recognized as a developer to the award-winning Pele suite.
Related publication: DOI: 10.1137/1.9781611977967.2.

2026 **Outstanding Postdoc Mentor Award**, *National Renewable Energy Laboratory*, Golden, CO

2023 **NREL Chairperson Team Award for Key Contributions**, *National Renewable Energy Laboratory*, Golden, CO

2022 **APS/DFD Milton van Dyke Award Winner**, *V0076: Simulation of an RCCI Engine using the Pele Suite of Exascale Codes*, 75th Annual Meeting of APS/DFD, Indianapolis, IN.

2022 **Postdoc Technical Innovation Award**, *National Renewable Energy Laboratory*, Golden, CO.

2021 **Recognition of Contributions to Applied Math Department**, *West Point*, West Point, NY

Software and Models

DOE Laboratory Software Records

2026 **MELT-UI [SWR-26-071]**, *Machine Learning Toolbox user interface*
Developer of the user interface for PT-MELT and TF-MELT backends. Software repository.

2025 **Network-pruner (Neural network pruning analysis) [SWR-25-113]**, *J. Gafur, M. Milkert, N. T. Wimer, and K. Griffin*, National Renewable Energy Laboratory
`https://doi.org/10.11578/dc.20251105.3`

2024 **PT-MELT (PyTorch Machine Learning Toolbox) [SWR-24-110]**, *N. T. Wimer*
Reusable neural-network architectures and workflows for model training, evaluation, and deployment. Software repository.
Related release (2025): Hydrogen-electrolysis surrogate models with uncertainty estimates; listed contact: N. T. Wimer.

2022 **PeleLMeX [SWR-22-48]**, *J. Bell, A. Nonaka, M. Day, L. Esclapez, N. T. Wimer, M. T. Henry de Frahan, J. Rood, S. Appukuttan, D. Montgomery, B. Perry, and R. Grout*
`https://doi.org/10.11578/dc.20220621.1`

2022 **MPRL (Multi-Pulse Reinforcement Learning) [SWR-22-49]**, *N. T. Wimer, M. T. Henry de Frahan, and S. Yellapantula*, National Renewable Energy Laboratory
`https://doi.org/10.11578/dc.20220819.1`

Open Source Research Software

2026 **ERF-Fire**, *Coupled fire–atmosphere modeling framework*
Developer of the ERF-Fire framework. Software repository.

2024 **AI/ML tutorial notebooks and utilities**, *NREL/NLR AI repository*
Contributed the initial framework and scientific machine-learning notebooks, including Bayesian neural networks, uncertainty quantification, and hyperparameter tuning. Software repository.

2023 **TF-MELT (TensorFlow Machine Learning Toolbox)**, *N. T. Wimer*
Reusable TensorFlow machine-learning workflows, including Bayesian neural-network functionality. Software repository.

2023 **ml-iap-uq**, *Uncertainty quantification for machine-learned interatomic potentials*
Training and evaluation code using KLIFF and PT-MELT, with deep ensembles, dropout, mean–variance estimation, mixture-density networks, and Bayesian neural networks. Software repository.

2022 **ytScripts**, *Simulation data analysis and visualization*
Python tools for parallel extraction, analysis, and visualization of simulation datasets using yt. Software repository.

2017 **AthenaRRT**, *Reacting Rayleigh–Taylor instability simulations*
Research software based on Athena 4.2 with support for the reacting Rayleigh–Taylor instability. Software repository.

Proprietary and Commercial Software

2026 **Advanced Engineering Software (AES)**, *Developer*
Hydrologic modeling software; development of updates supporting the 2026 San Bernardino County and San Diego Hydrology Manuals.

2025 **FluHyd-eX**, *Developer*
AMReX-based coupled surface-water and groundwater modeling software. Commercialization planned.

2023 **FluHyd (Fluid Dynamics and Hydrology) Toolbox**, *Developer*
Fluid-dynamics and hydrology analysis tools, including precipitation, streamflow, and groundwater data workflows.

Acknowledged Research Contributions

2026 **Comparative study of ensemble-based uncertainty quantification methods for neural network interatomic potentials**, *Y. Kurniawan, M. Wen, E. B. Tadmor, and M. K. Transtrum*, Machine Learning: Science and Technology, 7(5), 055018
Acknowledged for discussions and insights.

2025 **A Neural-Network-Enhanced Parameter-Varying Framework for Multi-Objective Model Predictive Control Applied to Buildings**, *D. Wald et al.*, Energy and AI, 21, 100566
Credited for developing TF-MELT and its Bayesian neural network functionality.

2022 **Computational Discovery of Salt Hydrates for Thermal Energy Storage**, *S. Kiyabu*, Ph.D. dissertation, University of Michigan
Acknowledged for mentorship during the author's NREL internship. Dissertation.

2021 **Research and Analysis of Optimizing Airfoil Geometry and Angle of Attack to Maximize Short Takeoff and Landing Capabilities**, *J. Wozniak*, IJERT, 10(04)
Acknowledged for CFD expertise and assistance conducting simulations. Paper.

2018 **Large Eddy Simulations of Industrial Burners**, *S. P. Nigam*, M.S. thesis, University of Colorado Boulder
Credited for research assistance and contributions to the thesis. Thesis.

2015 **Budget Period 2 Summary Report, Part 2: Hywind Maine Project**, *National Renewable Energy Laboratory / Statoil*, Public report
Acknowledged as a contributor to preparation of the report's technical material. Report.

2015 **Coalescing Wind Turbine Wakes**, *S. Lee et al.*, Journal of Physics: Conference Series, 625(1), 012023
Acknowledged as a project team member for insightful discussions.

Research Mentoring and Supervision

2023–current **Julia Ream**, *Postdoctoral researcher: CFD-assisted scale-up of bioreactor design*, National Renewable Energy Laboratory (NREL)
Coauthored conference presentations on bioreactor microenvironments and scale-up.

Summer 2024 **Riley Fisher**, *Python interfaces for the Pele simulation suite*, National Renewable Energy Laboratory (NREL)
Coauthored the 2024 APS Division of Fluid Dynamics presentation, "Extending the Pele Suite through Python and pyAMReX."

Summer 2021 **Steven Kiyabu**, *MELODIES: MachinE Learning Ordinary DIfferential Equations Solver*, National Renewable Energy Laboratory (NREL)
Coauthored the 2021 Rocky Mountain Fluid Mechanics Research Symposium presentation, "Modeling Combustion Reaction ODEs with Neural Networks."

Research Grants

As Principal Investigator

2021-2022 **National Renewable Energy Laboratory**, *Fire Brand Modeling of Roof System for R&D Lab*, Total to NREL: $50,000, N. T. Wimer share: $50,000

Teaching Experience

April 2021 **USMA West Point**, *Department of Mathematical Sciences*, Guest Lecturer, West Point, NY

Spring 2018 **MCEN 6001: Reacting Flows**, TA, Department of Mechanical Engineering, University of Colorado, Boulder (cross-listed with ASEN 6519: Reacting Flows)

Fall 2017 **MCEN 5021: Introduction to Fluid Dynamics**, TA, Department of Mechanical Engineering, University of Colorado, Boulder

Spring 2013 **Fluid Dynamics**, Undergraduate Student Guest Lecturer, Department of Mechanical Engineering, Dartmouth College. Hanover, NH

2011-2013 **Teaching Assistant**, *Fluid Dynamics, Advanced Fluid Dynamics, Differential Equations, Distributed Field Theory, Introduction to Engineering Design Methodology, Materials, Physics for Future Leaders*, Dartmouth College, Hanover, NH

Journal Reviews

Journal of Fluid Mechanics, Fire Technology, Proceedings of the Combustion Institute, International Journal of Engine Research, Ocean Engineering, Forests, International Journal of Geo-Information.