

Exponent® Engineering & Scientific Consulting

# Jacob West, Ph.D.

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## **Professional Profile**

Dr. West is a mechanical engineer with expertise in the thermal sciences, including fluid mechanics, heat transfer, and shock wave propagation through solids, liquids, and gases. He has experience using complex numerical simulations to answer engineering questions across a variety of applications, as well as performing experimental testing of thermal-fluid systems.

Prior to joining Exponent, Dr. West completed his M.S. and Ph.D. in Mechanical Engineering at Stanford University, where he developed and used advanced numerical simulations to study various phenomena in flow physics. His Masters' research focused on understanding the fundamental limitations to energy extraction in large wind farms using large eddy simulation of wind turbines in the atmospheric boundary layer. His Ph.D. research was sponsored by the U.S. Department of Energy and involved simulation of a variety of multiphase flow systems. These include radiatively heated particle-laden turbulence with application to a novel solar energy concept, and high-velocity impacts of metal projectiles resulting in severe material deformation and strain hardening. This work involved significant collaboration with scientists at Lawrence Livermore National Laboratory to expand and validate their simulation capabilities.

Dr. West has also practiced as a design engineer at Peterbilt Motors Company, focusing on design and integration of diesel emissions systems into heavy duty trucks. He has experience creating testing protocols to detect faults before production, investigating production failures, investigating field failures, and with warranty analysis.

### Academic Credentials & Professional Honors

- Ph.D., Mechanical Engineering, Stanford University, 2023
- M.S., Mechanical Engineering, Stanford University, 2018
- B.S., Mechanical Engineering, Olin College of Engineering, 2011
- Argonne Training Program on Extreme-Scale Computing, 2020

Stanford Engineering Graduate Fellowship, 2016-2018

Franklin W. Olin Scholarship, 2007-2011

### Licenses and Certifications

Certified Fire and Explosion Investigator (CFEI)

#### Academic Appointments

Teaching Assistant for Engineering Design Optimization, Aeronautics and Astronautics, Stanford University, 2019

Teaching Assistant for Thermodynamics, Olin College, 2010-2011

#### Prior Experience

Graduate Research Assistant, Flow Physics and Aeroacoustics Laboratory, Stanford University, 2016-2023

High Energy Density Physics Intern, Lawrence Livermore National Laboratory, 2019

Design Engineer, Peterbilt Motors Company, 2013-2016

Associate Design Engineer, Peterbilt Motors Company, 2011-2013

#### **Publications**

"Assessment of diffuse-interface methods for compressible multiphase fluid flows and elastic-plastic deformation in solids". Jain, S.S.; Adler, M.C.; West, J.R.; Mani, A.; Moin, P.; Lele, S.K., Journal of Computational Physics, Volume 475, 2023, 111866 https://doi.org/10.1016/j.jcp.2022.111866.

"Scalable Parallel Linear Solver for Compact Banded Systems on Heterogeneous Architectures". Song, Hang; Matsuno, K.V.; West, J.R.; Subramaniam, A.; Ghate, A.S. & Lele, S.K. Journal of Computational Physics, Volume 468, 2022, 111443 https://doi.org/10.1016/j.jcp.2022.111443.

"Wind Turbine Performance in Very Large Wind Farms: Betz Analysis Revisited". West, J.R.; Lele, S.K. Energies 2020, 13, 1078 https://doi.org/10.3390/en13051078.

#### Presentations

"A high-order, localized artificial diffusivity method for Eulerian simulation of multi-material elastic-plastic deformation with strain hardening", West, J.R., Adler, M.C., & Lele, S. K. 17th International Workshop on the Physics of Compressible Turbulent Mixing, Atlanta, GA, 2022.

"Mean Velocity Scaling in Dilute Particle-Laden Channel Flow at Moderate Mass Loading", West, J.R. & Lele, S. K., 65th American Physical Society Division of Fluid Dynamics Annual Meeting, Phoenix, AZ, 2021.

"Toward a Mean Velocity Scaling in Variable Property Particle-Laden Channel Flow", West, J.R. & Lele, S. K., 64th American Physical Society Division of Fluid Dynamics Annual Meeting, Virtual, 2020.

"Particle-laden Channel Flow with Strong Radiative Heating", West, J.R. & Lele, S. K., 63rd American Physical Society Division of Fluid Dynamics Annual Meeting, Seattle, WA, 2019.

"Wind Turbine Performance in Very Large Wind Farms: Energy and Momentum Budgets for a Streamtube", West, J.R. & Lele, S. K., 62nd American Physical Society Division of Fluid Dynamics Annual Meeting, Atlanta, GA, 2018.

"Wind Turbine Performance in an Atmospheric Boundary Layer: Betz Analysis Revisited ", West, J.R. & Lele, S. K., 61st American Physical Society Division of Fluid Dynamics Annual Meeting, Denver, CO, 2017.