



Exponent[®]
Engineering & Scientific Consulting

Bernie Roesler, Ph.D., P.E.

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Professional Profile

Dr. Roesler specializes in the engineering analysis and experimental testing of thermal and flow processes and equipment. He consults in the areas of fire and explosion investigation, computational fluid dynamics (CFD) analysis, and alternative energy safety and performance.

Dr. Roesler's work at Exponent includes the evaluation of fire and explosion incidents, including origin and cause investigation, and equipment failures. He also has expertise in evaluating industrial facilities, such as natural gas distribution equipment, for compliance with federal, state, and local regulations. He has broad experience in laboratory and field testing, including the design, construction, and instrumentation of customized experimental apparatus for project-specific problems. Dr. Roesler also has CFD modeling experience with commercial software such as ANSYS Fluent and Star-CCM+, computer-aided design (CAD) experience with SolidWorks, and scientific computing experience in MATLAB and Python.

Prior to joining Exponent, Dr. Roesler completed his Ph.D. research at Dartmouth College, where he conducted model-scale experiments on a novel ship propeller design, and CFD modeling work for cross-flow propellers and hydrokinetic turbines. Dr. Roesler built a software design tool in MATLAB for cross-flow devices using a Vortex Lattice Method (VLM) model, and performed detailed studies using ANSYS Fluent commercial CFD software for model validation. He developed this tool in collaboration with the Ocean Renewable Power Company (ORPC) and researchers at the Penn State Applied Research Laboratory (ARL) to design a commercially viable cross-flow turbine. Dr. Roesler's research furthered the understanding of the unsteady forces acting on cross-flow devices due to hydrofoil vortex shedding and non-linear wake interaction.

Academic Credentials & Professional Honors

Ph.D., Engineering Sciences, Dartmouth College, 2018

B.Eng., Engineering Sciences, Dartmouth College, 2013

B.A., Engineering Sciences, Dartmouth College, 2012

2012-13 Herman and Margaret Hartmann Fellow

Professional Affiliations

American Clean Power Association (ACPA) Wind Technical Standards Committee

American Physical Society (APS)

- Division of Fluid Dynamics (APS-DFD)

National Association of Fire Investigators (NAFI)

National Fire Protection Association (NFPA)

Publications

Epps, Brenden P., Bernard T. Roesler, Richard B. Medvitz, Yeunun Choo, and Jarlath McEntee (2019). "A viscous vortex lattice method for analysis of cross-flow propellers and turbines." In: *Renewable Energy* 143 (1), pp. 1035–1052.

Epps, Brenden P. and Roesler, Bernard T. (2018). "Vortex Sheet Strength in the Sears, Küssner, Theodorsen, and Wagner Aerodynamics Problems". In: *AIAA Journal* 56 (3), pp. 889–904.

Roesler, Bernard T. and Brenden P. Epps (2018). "Discretization Requirements for Vortex Lattice Methods to Match Unsteady Aerodynamics Theory". In: *AIAA Journal* 56 (6), pp. 2478–2483.

Epps, Brenden P., Luke E. Muscott, Bernard T. Roesler, Gabriel D. Weymouth, and Bharathram Ganapathisubramani (2016). "On the inter-foil spacing and phase lag of tandem flapping foil propulsors". In: *Journal of Ship Production and Design*.

Roesler, Bernard T., Malia L. Kawamura, Eric Miller, Matthew Wilson, Jonathon Brink-Roby, Eric Clemmenson, Matthew Keller, and Brenden P. Epps (2016). "Experimental Performance of a Novel Trochoidal Propeller". In: *Journal of Ship Research* 60 (1), pp. 1–13.

Roesler, Bernard T., Manaure Francisquez, and Brenden Epps (2014). "Design and Analysis of Trochoidal Propulsors using Nonlinear Programming Optimization Techniques". In: 33rd International Conference on Ocean, Offshore and Arctic Engineering. OMAE. San Francisco, CA.

Presentations

Roesler, Bernard T. and Brenden Epps (2015). "Experimental Performance of a Novel Trochoidal Propeller". In: 68th Annual Meeting of the APS Division of Fluid Dynamics. Boston, MA.

Roesler, Bernard T. and Brenden Epps (2014). "Computational Modeling and Experimental Validation of a Trochoidal Propulsor". In: 67th Annual Meeting of the APS Division of Fluid Dynamics. San Francisco, CA.

Roesler, Bernard T., Manaure Francisquez, and Brenden Epps (2014). "Design and Analysis of Trochoidal Propulsors using Nonlinear Programming Optimization Techniques". In: 33rd International Conference on Ocean, Offshore and Arctic Engineering. OMAE. San Francisco, CA.

Epps, Brenden, Roesler, Bernard T., and Manaure Francisquez (2013). "Could flapping foil propulsion become a commercial shipping reality?" In: 66th Annual Meeting of the APS Division of Fluid Dynamics. APS-DFD. Pittsburgh, PA.

Peer Reviews

Journal of Fluid Mechanics

Naval Engineers Journal

Journal of Marine Science and Technology

ASME Journal of Offshore Mechanics and Arctic Engineering (OMAE)