Exponent®
Engineering & Scientific Consulting

Ruy Ibanez, Ph.D.

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Professional Profile

Dr. Ibanez applies his expertise and experience to analyses and investigations in multiple industries, including oil and gas, maritime, and wind energy. Dr. Ibanez's engineering analyses are focused on performance evaluation, failure analysis, device testing, and intellectual property matters. He performs these analyses on fluid devices and receptacles such as pumps, compressors, valves and tanks. His expertise encompasses fluid flow analysis and flow control analysis in fluid systems including pipes for transporting water and chemicals. Dr. Ibanez has experience with engineering analysis and investigative work in Latin America.

Oil and Gas

Dr. Ibanez has applied his expertise on matters involving pumps and controls of water injection systems, and matters involving failed pumps due to mechanical and electrical faults. Dr. Ibanez has studied cases where improperly designed pumps, compressors, valves, and controls systems limit the performance of water treatment facilities and oil separation systems. Dr. Ibanez has provided analysis in intellectual property matters related to systems comprised by pumps, pump controls in water treatment, oil separation systems, and valves.

Dr. Ibanez also uses his experience in investigations involving the analysis of acceptable safety standards in petrochemical facilities such as the transfer of hazardous materials from vehicles to facilities. Dr. Ibanez has analyzed acceptable drilling and completion practices in oil and gas to meet state and industry standards and regulations, as well as the application of state and industry regulations on the drilling and pumping of water wells.

Maritime and Offshore

Dr. Ibanez maritime and offshore experience extends beyond his oil and gas experience. Dr. Ibanez has experience performing engineering analysis in commercial ports, mooring design, and offshore wind turbines.

Dr. Ibanez uses his expertise for failure and performance analysis in offshore oil and gas systems, such as oil platforms. helping determine if standards are met such as those outlined by DNV (Det Norske Veritas), API (American Petroleum Institute) and ABS (American Bureau of Shipping).

Wind Energy Industry

Dr. Ibanez uses his expertise to perform aerodynamic analyses to provide clients with an understanding of aerodynamic aspects related to wind energy and other applicable fields. Dr. Ibanez has used computational fluid dynamics models for these investigations, including analyzing aerodynamic forces on

a hinged body. Dr. Ibanez has experience assessing wind energy performance for the optimization of electrical production.

Medical Device Facilities

Dr. Ibanez's expertise in fluid devices, fluid mixing and flow analysis enables him to regularly perform engineering assessments for medical sterilization facilities to help clients meet regulatory requirements, such as meeting Lower Explosive Level (LEL) requirements in piped systems transporting potentially explosive fluids.

Device Testing

Dr. Ibanez's extensive academic background as an experimentalist enables him to provide unique solutions to clients in need for custom product testing. Dr. Ibanez developed product testing projects at Exponent which include testing of ceramic tile characteristics and performance of consumer water hoses.

Prior to joining Exponent Dr. Ibanez completed his PhD work at the University of Rochester where he designed and manufactured his own experimental pump device to model biophysical flows with applications in the medical field. Dr. Ibanez complemented his experimental work with analytic and computational work. After completing his doctorate, Dr. Ibanez transitioned to industry work in the offshore energy sector as an engineer for 2H Offshore, where he performed riser analysis in oil and gas applications.

Dr. Ibanez has experience using computational models to complement his engineering analyses and investigations. In his work he has used STAR-CCM+ simulations for modeling of aerodynamic forces, Ansys Fluent for flow modeling, and FLEXCOM for structural and fluid-structure analysis in offshore structures. He also has utilized Python, MATLAB, and Excel for developing proprietary simulations and

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, University of Rochester, 2023

M.S., Mechanical Engineering, University of Rochester, 2019

B.S., Physics, University of Texas, Austin, 2015

Licenses and Certifications

FAA Remote Pilot Certificate

Transportation Workers Identification Card (TWIC)

Prior Experience

Engineer, 2H Offshore, 2022-2023

Graduate Research Assistant, University of Rochester, 2017-2022

Graduate Research Assistant, Baylor University, 2015-2017

Research Assistant, University of Texas at Austin, 2013-2015

Professional Affiliations

ASME (American Society of Mechanical Engineers)

APS (American Physical Society)

SPE (Society of Petroleum Engineers)

Languages

Spanish

Publications

R. Ibanez, A. Raghunandan, DH Kelley. Geometry-induced rectification of looped oscillatory flows. Phys. Rev. Fluids 2023; 8, 113101. doi:10.1103/PhysRevFluids.8.113101

R Ibanez, DH Kelley. A bioinspired apparatus for modeling peristaltic pumping in biophysical flows. Bioinspiration & Biomimetics 2022; 17 (6), 066023.

R Ibanez, M Shokrian, JH Nam, DH Kelley. Simple analytic model for peristaltic flow and mixing. Physical review fluids 2021; 6 (10), 103101.

R Ibanez, J Kuehl, K Shrestha, W Anderson. Brief Communication: A nonlinear self-similar solution to barotropic flow over varying topography. Nonlinear Processes in Geophysics 2018; 25:201-205.

R Ibanez, HL Swinney, B Rodenborn. Observations of the stratorotational instability in rotating concentric cylinders. Physical Review Fluids 2016; 1 (5), 053601.

Presentations

Ruy Ibanez, Mohammad Shokrian, Jong-Hoon Nam, Douglas H. Kelley; Simple Analytic Model for Peristaltic Flow and Mixing; SB3C; Cambridge, MD, 2022.

Ruy Ibanez, Mohammad Shokrian, Jong-Hoon Nam, Douglas H. Kelley; Experimental modeling of fluid homeostasis in the mammalian hearing organ; American Physical Society Division of Fluid Dynamics; Seattle, WA, 2019.

Ruy Ibanez, Catherine A. Knox, Jong-Hoon Nam, Douglas H. Kelley; Experimental modeling of fluid homeostasis in the mammalian hearing organ; American Physical Society Division of Fluid Dynamics; Atlanta, GA, 2018.

Ruy Ibanez Amador, Douglas Kelley, Jong-Hoon Nam; Experimental modeling of fluid homeostasis in the mammalian hearing organ; American Physical Society March Meeting; Los Angeles, CA, 2018.

Ruy Ibanez, Joseph Kuehl, Kalyan Shrestha, William Anderson; A nonlinear self-similar solution to barotropic flow over rapidly varying topography; American Physical Society Division of Fluid Dynamics; Denver, CO, 2017.

Ruy Ibanez, Joseph Kuehl; A nonlinear self-similar solution to barotropic flow over rapidly varying topography; American Physical Society Division of Fluid Dynamics; Portland, OR, 2016.

Ruy Ibanez, Harry L. Swinney, Bruce Rodenborn; Observation of the Stratorotational Instability in Flow between Rotating Concentric Cylinders; American Physical Society March Meeting; San Antonio, TX, 2015.

Project Experience

Performed global riser analysis for various offshore operators where the analysis was focused on intervention operations. Scopes included riser strength and fatigue analysis during connected and disconnected operations.

Supported offshore equipment design by providing loading analyses for design phase surface equipment in offshore riser systems. The resulting assessment aided collaborators in adjusting design capacities to accommodate extreme loading scenarios.

Experimentally researched oscillating fluid flows in closed loop systems using custom designed equipment. The experimental results were complemented with analytical and computational analyses. The study found an unexpected mechanism for producing a net flow in a looped channel, whose applications are linked to microfluidics and biological fluid flows.

Studied peristaltic pumping in biophysical and biomedical contexts using experiments, analytical models and numerical simulations. The study enhanced current understanding of the mammalian inner ear functions.

Developed analytical models for oceanographic fluid flows over a varying topography. The study resulted in advances toward deeper understanding and improved modeling of flows in oceanographic applications.

Investigated transition to unstable flow in density varying rotating fluids using experiments. The results advanced the understanding of the underlying mechanisms in the formation of planets.

Peer Reviews

Journal of Fluid Mechanics