JOHNS HOPKINS UNIVERSITY

Center for Environmental & Applied Fluid Mechanics

The Inaugural Kovasznay Memorial Lecture in Fluid Dynamics

Tuesday, April 22, 2o25, 3:00-4:30 PM*

"Weaving Tangled Vortex Webs"

Prof. William T. M. Irvine
University of Chicago

Vortices imbue flow with dynamism: in isolation, their mesmerizing evolution provides a window onto some of the most fundamental aspects of flow. Combined into a space-filling tangle they provide the scaffold of turbulence. I will talk about experimental techniques to controllably weave vortex webs on demand, starting from isolated vortex knots and links and progressing to isolated blobs of turbulence. I will show how isolated vortex knots provide insights into conserved quantities in fluid mechanics: helicity (aka vortex knottiness) and how turbulence can be assembled, controlled, and endowed with tunable cocktails of conserved quantities using vortex lego. Finally, I will show how isolated turbulent blobs provide insight into the expansion of turbulence into quiescence.

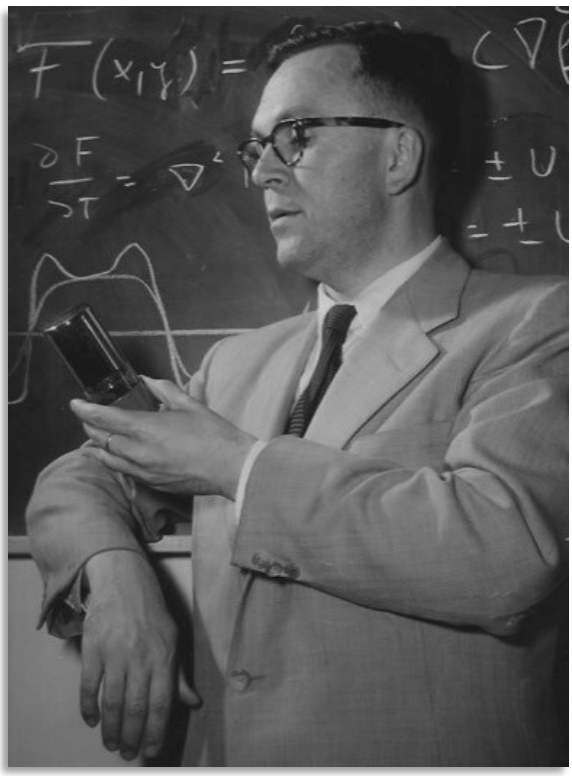
About the speaker

Dr. William T. M. Irvine is a Professor of Physics at the University of Chicago. He obtained his PhD in Physics from UCSB and a DPhil from Oxford on quantum optics and performed postdoctoral work with Paul Chakin at NYU focusing on colloidal crystals in curved space. His research group at the University of Chicago studies topics in fluid mechanics, turbulence, mechanics and soft condensed matter physics, with a broad definition of each. His honors include Sloan, Packard, and Brown fellowships.

*Reception to follow: South Lobby, Hackerman Hall, above Robotorium

About Professor Leslie S. G. Kovasznay

A world leader in turbulent flow research and technology development, best known for innovative concepts, novel experimental techniques, and crucial measurements, Dr. Kovasznay was the author or co-author of more than eighty papers.



He was born in Budapest on April 14, 1918, and earned his doctorate in technological sciences at the Royal Hungarian Institute of Technology in 1943. He moved to the U.S. in 1947 and joined the new Aeronautics Department at Johns Hopkins University, where he remained on the faculty for 31 years. He moved to the University of Houston in 1979, where he was Professor of Mechanical Engineering until his death on April 17, 1980, at the age of 62.

He was a Fellow of the American Physical Society and the American Academy of Arts and Sciences, a Senior Member of the Institute of Electrical and Electronics Engineers, and a Member of the American Institute of Aeronautics and Astronautics. He received several honorary doctorates. Dr. Kovasznay contributed to theoretical fluid dynamics with a model for turbulence spectrum that bears his name, with an innovative categorization of gas dynamic fluctuations into vorticity, sound, and entropy modes, stability and exploration of new analytical solutions to the Navier-Stokes equations (the Kovasznay flow to model flow behind a grid). After his arrival at Johns Hopkins, he became a consultant for the National Bureau of Standards, for which he designed an improved hot-wire anemometry electronic system. He developed the first basic procedures for hot-wire anemometers in supersonic flows. In the 1970s he focused also on aerodynamic sound generation and interactions of sound and turbulence. His legacy is marked by original ideas, pioneering concepts, and transformative technologies that advanced various fields of science and engineering.