Dr. Dixia Fan

Dr. Dixia Fan obtained his Ph.D. (2019) and MSc (2016) from MIT Mechanical Engineering and BSc (2013) from Shanghai Jiaotong University Naval Architecture, Ocean and Civil Engineering. He is currently an assistant professor at Queens University, a research scientist at MIT Sea Grant Initiative and the American Bureau of Shipping (ABS) research fellow. In 2022, He will join Westlake University as an assistant professor. He founded the MIT "lab of pink coach" in 2019, featuring the world's first intelligent towing tank (ITT) and is in charge of the i4-FSI lab at Queen's University (intelligent, informational, integrative, and interdisciplinary fluid-structure interaction). His research interests focus on physics-informed (and -informative) machine learning and bio-inspired design of vortical flow control and sensing for marine and aerospace applications. Recently he has been awarded the de Florez prize from MIT and the Nico van Wingen prize from Society of Petroleum Engineers (SPE), and his work has been featured in multiple media, including the cover page of the 40 years anniversary of the Discover Magazine.

Keynote Presentation 1:
Intelligent Fluid Mechanics for Next-Generation Aerial/Marine Exploration and Exploitation: A confession by a "lazy" fluid mechanist

Fluid motions can be seen everywhere in our environmental and industrial processes and account for a big part of the human energy consumption that, for example, propels aircraft and ships. However, our understanding and control of the flow motion are still limited due to the inherent spatial and temporal non-linearity and multiscality of fluid-related problems. In this talk, I will discuss how automated science and intelligent bio-inspired design may provide a potential paradigm shift in fluid-structure interaction (FSI) research and can help create next-generation marine and aerospace applications to explore and exploit our resource safely, efficiently and environmental-friendly. I will provide two examples: 1) the development of the world's first intelligent towing tank as part of an effort to construct a digital twin for marine riser vortex-induced vibration monitoring, and 2) the vortical flow control and sensing of flapping wings for novel dual aerial/aquatic vehicles. Finally, I will close my talk with my humble vision of creating future intelligent fluid mechanics research.