The Department of Mechanical Engineering
College of Engineering and Applied Sciences
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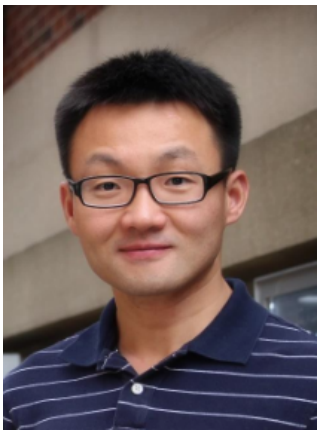
Mechanical Engineering Seminar



Jiarong Hong, Ph.D.

Department of Mechanical Engineering, Saint Anthony Falls Laboratory, University of Minnesota

Friday, March 8, 2019 at 11:00 AM, Room 173 Light Engineering Building

Lecture: A Path Towards Innovative Flow Field Imaging

Abstract

Scientific discoveries in the modern era have been largely driven by the advancement of observation and measurement tools. In this presentation, I will illustrate the implementation of such tool-driven methodology in the context of fluid mechanics with three examples. As the first example, I will describe the development of super-large-scale flow visualization and particle image velocimetry (PIV) at a scale on the order of 100 m, using natural snowflakes as tracers, to probe into the complex flow phenomena in the near wake of a 2.5 MW wind turbine. In the second case, we advance both the numerical reconstruction and hardware design of digital inline holography for high-resolution 3D flow measurements over a broad range of applications with a compact setup and at significantly lower cost compared to commercialized 3D flow diagnostic tools. The last example showcases our ability to apply PIV across liquid-gas interface to examine the internal gas movement inside a free standing cavity generated from ventilation. The motivation, the challenges, the technical details as well as the scientific outcomes and prospects of each case of tool development will be provided. Through these examples, I will demonstrate such tool-driven approach not only enables specific scientific questions to be addressed, but also opens up new opportunities and areas for research in the field of fluid mechanics and beyond.

Biography

Jiarong Hong is an associate professor and McKnight-land-grant Professor in Mechanical Engineering Department and Saint Anthony Falls Laboratory at University of Minnesota. He received his bachelor degree from University of Science and Technology of China in 2005, M.S. and Ph.D. from Johns Hopkins University in 2008 and 2011, and started his career at University of Minnesota in 2012. His research is focused on understanding the dynamic processes involved in the interaction between flow and environment, with innovative approach and instrumentation to tackle the challenges in the measurements of complex flow fields, for a wide range of applications. Hong is a recipient of National Science Foundation CAREER Award and Office of Naval Research Young Investigator Award.

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