COMBUSTION WEBINAR

Prechamber Turbulent Jet Ignition for IC Engines

Speaker: Li Qiao, Purdue University

Time: Dec. 11th 2021

10 am EST; 16:00 Paris; 23:00 Beijing.

Zoom Meeting ID: 959 5515 8623
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Biography: Li Qiao is a Professor in the School of Aeronautics & Astronautics at Purdue University. She also holds a courtesy appointment in the School of Mechanical Engineering. She earned BS and MS degrees in Engineering Mechanics from Tsinghua University in 1999 and 2001, and a PhD in Aerospace Engineering from the University of Michigan in 2007. Her research has focused on the development of new technologies and the understanding of basic science in the areas of fuels, combustion, and sustainable energy. She is the recipient of the National Science Foundation CAREER Award (2013), the Air Force Office of Scientific Research Young Investigator Award (2013), and the Army Research Office Young Investigator Award (2010). She is an Associate Fellow of American Institute of Aeronautics & Astronautics (AIAA) and an Associate Editor of the AIAA Journal. She currently serves on the Board of Directors of the Combustion Institute.

Abstract: Increasing the efficiency of internal combustion engines, due to their current and future high market share, is critical to achieve the common goal of a sustainable approach to the environment. Prechamber jet ignition technology is being actively explored by the transportation sector for spark ignition and hybrid engines, because it has the potential to increase combustion efficiency, reduce cycle-to-cycle variability, and enable engines to operate under lean-burn or highly diluted conditions. The major advantage of prechamber ignition, as compared to spark ignition, is that its high-speed jets produce multiple, distribution ignition sites, leading to rapid consumption of the main charge with minimum cycle variations. At Purdue, we developed an optical-accessible, bench-mark experiment to enable a fundamental understanding of the mechanisms of prechamber jet ignition. The effect of prechamber design on engine performance will be presented, and the challenges of simulating prechamber ignition engines will be discussed.

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