

OpenFOAM & Combustion Simulation



Simulations of Forced Ignition Processes using OpenFOAM

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Host: Prof. Huangwei Zhang (National University of Singapore)

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Abstract

Forced ignition is one of most fundamental and important problems in combustion. Understanding forced ignition is important not only for fundamental combustion research but also for developing advanced combustion engines and controlling of fire and accidental explosions. Though providing physical interpretation and helpful insights on ignition process, classical ignition theory is constrained by the assumptions of simplified chemistry and flow. OpenFOAM is a useful numerical tool for ignition research. We have assessed the effects of complicated chemistry (e.g., low-temperature) and flow (e.g., turbulence or other imposed flow) on forced ignition processes using EBIdnsFoam developed based on OpenFOAM at Karlsruhe Institute of Technology. In this talk, the effects of low temperature chemistry on hot particle induced ignition of dimethyl ether/air mixtures and on ignition kernel development and flame propagation in a dimethyl ether-air mixing layer will be first presented. Then, the effects of electrodes and imposed flow on forced ignition in laminar premixed hydrogen/air mixtures with large Lewis number will be discussed.

About the Speaker

Dr. Zheng Chen is currently a professor at Peking University. He received his bachelor and master degrees from Tsinghua University, and Ph.D. degree from Princeton University. His research focuses on the flame dynamics of fundamental combustion processes. Combining theoretical analysis, numerical simulation, and experiment measurement, he has worked on challenging problems on ignition theory, accurate laminar flame speed measurement, deflagration-to-detonation transition, and detonation engines. He was awarded the Bernard Lewis Fellowship and Hiroshi Tsuji Early Career Researcher Award from the Combustion Institute, and the Young Investigator Prize from Asian-Pacific Conference on Combustion. He is a fellow of the Combustion Institute, and is currently on the Board of Directors of the Combustion Institute and the Institute for Dynamics of Explosions and Reactive Systems. He serves as the associate editor of Combustion and Flame.

