

OpenFOAM & Combustion Simulation



Modeling of Turbulent Combustion using OpenFOAM Platform

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Host: Dr. Leo (Xiaohang) Fang (University of Oxford)

Register: https://nus-sg.zoom.us/webinar/register/WN_z_LmudEwSAeC4vH6mosCDA



Abstract

OpenFOAM solver has been used in our group to numerically simulate turbulent combustion processes in internal combustion engines, gas turbine engines and power plants. In simulations of internal combustion engines that involve multiple combustion modes, e.g., ignition, ignition assisted premixed flames and diffusion combustion, large chemical kinetic mechanisms may be needed. This seminar describes some high efficiency methods and models developed based on OpenFOAM platform for engine combustion processes, which include chemistry coordinate mapping (CCM), Eulerian stochastic fields (ESF), and ESF coupled with flamelet generated manifold (FGM) approach. Application of these methods to HCCI, RCCI and PPC engines and swirling premixed flames will be discussed. OpenFOAM based solver has been developed to simulate solid biomass combustion and gasification in fixed bed and fluidized bed reactors. A specific issue of local overloading of solid particles will be discussed and solution method will be presented.

About the Speaker

Professor Xue-Song Bai joined the Department of Energy Sciences of Lund University in April 1995 where he heads a research group in the Division of Fluid Mechanics focusing on Reactive Fluid Dynamics. Prof. Bai received his Ph.D. degree in Fluid Mechanics from Royal Institute of Technology, Sweden in 1994 and his Docent from Lund University in 1997. He became senior lecturer in the Department of Energy Sciences of Lund University in 1999, and since 2002 he is a professor in the Division of Fluid Mechanics, Department of Energy Sciences of Lund university. Prof. Bai's research interests include theory of flame propagation and extinction, mechanisms of pollutant formation in chemically reactive flows, modelling of turbulence/chemistry interaction, direction numerical simulation and large eddy simulation of turbulent reactive flows, modelling of solid/gas and liquid/gas turbulent two-phase reactive flows, with application to different energy conversion processes in internal combustion engines, gas turbines, and biomass furnaces. In 2018 Prof. Bai was elected the Fellow of Combustion Institute.

