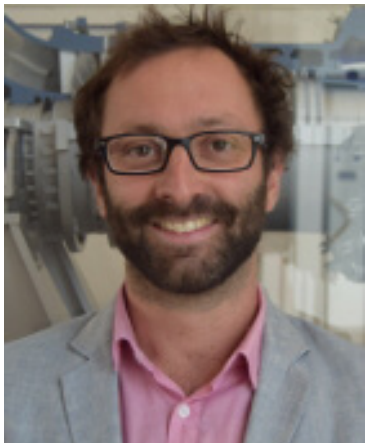
UNIVERSITY OF MARYLAND

THE BURGERS PROGRAM FOR FLUID DYNAMICS
FLUID DYNAMICS REVIEWS SEMINAR SERIES

UNDERSTANDING THE ATOMIZATION PROCESS FOR FUEL INJECTION IN GAS TURBINES



Friday, February 7, 2020 | 11am - 12pm
2164 Martin Hall, DeWALT Seminar Room

Guest Speaker

DR. GEOFFROY CHAUSSONNET

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ABSTRACT

The fuel injection system in modern gas turbines is critical, especially for transient operations such as ignition or high altitude relight. The fuel must be sprayed in a few milliseconds, over a length of few millimeters, into droplets of ~20 μm. It is therefore crucial to understand the process of liquid atomization in its early phase: the primary breakup. This knowledge would enable to design efficient nozzles and to derive low-order models for numerical simulations at the combustor scale. Liquid atomization is strongly dependent on the nozzle design and therefore we focus our investigation on prefilming airblast atomization.

This talk summarizes recent investigations on prefilming airblast atomization made at the Karlsruhe Institute of Technology. The experiment and its main conclusion are presented. A mechanism to describe the prefilming airblast atomization is proposed and compared to other recent models from the literature. The models are also compared to the experiment in unsteady regimes, i.e. in case of a fluctuating flow field, and the behaviour of a low-pass filter is highlighted. Finally, more pragmatic approaches such as numerical simulation, statistical tools and deep learning methods are presented to derive low-order models.

BIO

Dr. Geoffroy Chaussonnet is a research professor at the Institute of Thermal Turbomachinery of the Karlsruhe Institute of Technology (KIT, Karlsruhe, Germany) and is currently a visiting scholar at the department of Aerospace Engineering of the University of Maryland (UMD, College Park, MD). He received his doctoral degree at the European Center for Advanced Research and Formation in Scientific Computation (CERFACS, Toulouse, France) in 2014 in the field of fluids mechanics where he developed liquid/wall interactions and atomization models for reactive LES of helicopter combustion chambers. His research activities tackle the numerical and experimental studies of liquid atomization in the field of aerospace and bio-fuel production.

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