Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

Uncertainty quantification for LES of auto-igniting flames GUILHEM LAVABRE, OLIVIER GICQUEL, RONAN VICQUELIN, CentraleSupelec — In combustion studies, state of the art reactive Large Eddy Simulation, or LES, is praised for its high-fidelity, due to its high resolution in both space and time. However, LES still carries uncertainties which can significantly impact the quantities of interest. These uncertainties can come, for example, from model calibration, operating conditions, exact composition of complex fuels, etc. In this context, the propagation of these uncertainties through the simulation is essential to gauge the result's confidence. However, as LES is expensive, sample-efficient methods are needed to make uncertainty propagation affordable.
This presentation will focus on proposing a method to propagate chemical and experimental uncertainties in the LES of the H_2 Cabra flame, which is an auto-igniting flame. A proper uncertain dimension reduction will be inferred from a reduced - yet representative - physical problem. Several surrogate modelling methods and their associated design of experiments will then be compared on this same reduced physical problem to put forward a suitable method for uncertainty propagation through LES.

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Date submitted: 31 Jul 2020 Electronic form version 1.4