Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Adjoint based sensitivity analysis of a reacting jet in crossflow PALASH SASHITTAL, TARANEH SAYADI, University of Illinois, Urbana-Champaign, PETER SCHMID, Imperial College London — With current advances in computational resources, high fidelity simulations of reactive flows are increasingly being used as predictive tools in various industrial applications. In order to capture the combustion process accurately, detailed/reduced chemical mechanisms are employed, which in turn rely on various model parameters. Therefore, it would be of great interest to quantify the sensitivities of the predictions with respect to the introduced models. Due to the high dimensionality of the parameter space, methods such as finite differences which rely on multiple forward simulations prove to be very costly and adjoint based techniques are a suitable alternative. The complex nature of the governing equations, however, renders an efficient strategy in finding the adjoint equations a challenging task. In this study, we employ the modular approach of Fosas de Pando *et al.* (2012), to build a discrete adjoint framework applied to a reacting jet in crossflow. The developed framework is then used to extract the sensitivity of the integrated heat release with respect to the existing combustion parameters. Analyzing the sensitivities in the three-dimensional domain provides insight towards the specific regions of the flow that are more susceptible to the choice of the model.

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Date submitted: 01 Aug 2016 Electronic form version 1.4