Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

A Lagrangian Analysis of Extinction and Reignition in Bluff-Body Stabilized Flames[1] HARSHAVARDHANA A. URANAKARA, YU JEONG KIM, HONG G. IM, King Abdullah Univ of Sci Tech (KAUST), KAUST TEAM — The blow-off dynamics of flames stabilized on a meso-scale bluff-body are investigated using direct numerical simulations (DNS) data with a Lagrangian particle tracking analysis. Two dimensional DNS are performed using lean premixed hydrogen-air flames in the presence of hydrodynamic instabilities. The sequence of events that lead to local extinction and final flame blow-off are investigated by following the Lagrangian particles by examining their local characteristics in terms of explosive dynamics by employing Computational Singular Perturbation (CSP) and Tangential Stretching Rate (TSR) techniques. In particular, we investigate the effects of strain rate, time scales (flow and chemical), and CSP and TSR metrics on the development of localized extinction spots and their growth leading to final blow-off. The critical flame extinction that could lead to the ultimate blow-off is discussed.

[1]This work was sponsored by King Abdullah University of Science andTechnology (KAUST) and computing cluster provided by KAUST Su-percomputing Laboratory (KSL)

Yu Jeong Kim
King Abdullah Univ of Sci
Tech (KAUST)

Date submitted: 10 Aug 2020 Electronic form version 1.4