

Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Blowoff characteristics of bluff-body stabilized syngas premixed flame in a meso-scale channel BOK JIK LEE, HONG G. IM, King Abdullah University of Science and Technology, KAUST TEAM — Syngas has been actively studied recently for the application to Integrated Gasification Combined Cycle systems. It is also considered a candidate of fuels for combustion-based portable power-generating devices accompanied with a micro-reformer. In the present study, high-fidelity reacting flow simulations are conducted to investigate the instability near the blowoff limit of syngas premixed flames stabilized by a bluff-body in a meso-scale channel. Flames in a two-dimensional channel of 1 mm height and 10 mm length with a square box of 0.5 mm sides is considered. When the vortex shedding in a non-reacting flow at a mean inflow velocity remains symmetric as time passes, the flame at this inflow velocity tends to remain stable. By increasing the mean inflow velocity from the solution of this stable condition, the blowoff limit of a CO-to-H₂ ratio is identified. At near-blowoff regime, the detail dynamics of flame instability and combustion characteristics associated to the instability are presented. The comparison with the simulations for lean hydrogen/air premixed flames is also discussed.

Hong Im
King Abdullah University of Science and Technology

Date submitted: 02 Aug 2014

Electronic form version 1.4