Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

LES of turbulent lifted CH4 /H2 flames using a novel FGM-PDF model[1] S. EBRAHIM ABTAHIZADEH, JEROEN VAN OIJEN, ROB BASTIAANS, PHILIP DE GOEY, Eindhoven University of Technology — This study reports on numerical investigations of preferential diffusion effects on flame stabilization of turbulent lifted flames using LES with a FGM-PDF approach. The experimental test case is the Delft JHC burner to study Mild combustion; a clean combustion concept. In this burner, CH4 based fuel has been enriched from 0 to 25% of H2. Since the main stabilization mechanism of these turbulent flames is autoignition, the developed numerical model should be able to predict this complex event. Furthermore, addition of hydrogen makes modeling even more challenging due to its preferential diffusion effects. These effects are increasingly important since autoignition is typically initiated at very small mixture fractions where molecular diffusion is comparable to turbulence transport (eddy viscosity). In this study, first, a novel numerical model is developed based on the Flamelet Generated Manifolds (FGM) to account for preferential diffusion effects in autoignition. Afterwards, the developed FGM approach is implemented in LES of the H2 enriched turbulent lifted jet flames. Main features of these turbulent lifted flames such as the formation of ignition kernels and stabilization mechanisms are thoroughly analyzed and compared with the measurements of OH chemiluminescence.

[1]The authors gratefully acknowledge the financial support of the Dutch Technology Foundation (STW) under project No. 10414.

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Date submitted: 24 Jul 2014 Electronic form version 1.4