Abstract Submitted
for the DFD08 Meeting of
The American Physical Society

The structure of partially-premixed methane/air flames under varying premixing CELINE KLUZEK, ADONIOS KARPETIS, Texas A&M University — The present work examines the spatial and scalar structure of laminar, partially premixed methane/air flames with the objective of developing flamelet mappings that capture the effect of varying premixture strength (air addition in fuel.) Experimental databases containing full thermochemistry measurements within laminar axisymmetric flames were obtained at Sandia National Laboratories, and the measurements of all major species and temperature are compared to opposed-jet one-dimensional flow simulation using Cantera and the full chemical kinetic mechanism of GRI 3.0. Particular emphasis is placed on the scalar structure of the laminar flames, and the formation of flamelet mappings that capture all of the salient features of thermochemistry in a conserved scalar representation. Three different premixture strengths were examined in detail: equivalence ratios of 1.8, 2.2, and 3.17 resulted in clear differences in the flame scalar structure, particularly in the position of the rich premixed flame zone and the attendant levels of major and intermediate species (carbon monoxide and hydrogen).

Celine Kluzek
Texas A&M University

Date submitted: 05 Aug 2008 Electronic form version 1.4