

Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Inadequacy representation of flamelet-based RANS model for turbulent non-premixed flame¹ MYOUNGKYU LEE, TODD OLIVER, ROBERT MOSER, The University of Texas at Austin — Stochastic representations for model inadequacy in RANS-based models of non-premixed jet flames are developed and explored. Flamelet-based RANS models are attractive for engineering applications relative to higher-fidelity methods because of their low computational costs. However, the various assumptions inherent in such models introduce errors that can significantly affect the accuracy of computed quantities of interest. In this work, we develop an approach to represent the model inadequacy of the flamelet-based RANS model. In particular, we pose a physics-based, stochastic PDE for the triple correlation of the mixture fraction. This additional uncertain state variable is then used to construct perturbations of the PDF for the instantaneous mixture fraction, which is used to obtain an uncertain perturbation of the flame temperature. A hydrogen-air non-premixed jet flame is used to demonstrate the representation of the inadequacy of the flamelet-based RANS model.

¹This work was supported by DARPA-EQUiPS(Enabling Quantification of Uncertainty in Physical Systems) program.

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Date submitted: 28 Jul 2017

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