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Large Eddy Simulation of Flame Flashback in Swirling Premixed Flames CHRISTOPHER LIETZ, VENKATRAMANAN RAMAN, Univ of Texas, Austin — In the design of high-hydrogen content gas turbines for power generation, flashback of the turbulent flame by propagation through the low velocity boundary layers in the premixing region is an operationally dangerous event. Predictive models that could accurately capture the onset and subsequent behavior of flashback would be indispensable in gas turbine design. The large eddy simulation (LES) approach is used here to model this process. The goal is to examine the validity of a probability distribution function (PDF) based model in the context of a lean premixed flame in a confined geometry. A turbulent swirling flow geometry and corresponding experimental data is used for validation. A suite of LES calculations are performed on a large unstructured mesh for varying fuel compositions operating at several equivalence ratios. It is shown that the PDF based method can predict some statistical properties of the flame front, with improvement over other models in the same application.

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