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FDF Simulation of a Realistic Gas Turbine Combustor NASEEM ANSARI, University of Pittsburgh, ANSYS Inc., PATRICK PISCIUNERI, University of Pittsburgh, PETER STRAKEY, National Energy Technology Laboratory, PEYMAN GIVI, University of Pittsburgh — The unstructured scalar filtered mass density function (SFMDF) is employed for the large eddy simulation (LES) of a realistic swirl flame combustor. This is the PRECCINSTA experimental burner from the German Aerospace Center (DLR) [1]. This burner is a reasonable representation of an industrial gas turbine combustor and has been the subject of broad experimental and computational investigations. To keep the geometrical complexity of the burner intact, the fuel injection holes are meshed along with radial swirler vanes and the mixing zone prior to the nozzle exit. Combustion chemistry is modeled with a reduced mechanism featuring 16 species and 12 reaction steps. The simulated data are analyzed by comparison of the Reynolds-averaged statistics with experimental data and show excellent agreement. This demonstrates the capability of FDF for LES of complex flows, and warrants future applications of the methodology for LES of practical combustor configurations.

[1] W. Meier, P. Weigand, X.R. Duan, and R. Giezendanner-Thoben. Detailed characterization of the dynamics of thermoacoustic pulsations in a lean premixed swirl burner. *Combust. Flame*, **150**:2-26, (2007).

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