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LES study of intermittency in soot formation in a model aircraft combustor HEESEOK KOO, VENKAT RAMAN, Univ of Michigan - Ann Arbor, MICHAEL MUELLER, Princeton University, KLAUS PETER GEIGLE, German Aerospace Center — Intermittent soot formation is one of the modeling challenges that prevent accurate predictions of soot concentration in a turbulent reacting flow. Due to the highly unsteady and irregular sooting behavior, formation of soot is acutely sensitive to the flow and gas phase history. Therefore, we need to accurately capture interactions between soot chemistry, particle dynamics, and turbulent flame as well as the turbulent reacting flow. In this study, large eddy simulation (LES) is used to understand the model sensitivity to the soot prediction. Hybrid method of moment (HMOM) soot model is used that accommodates detailed process of soot particle and soot precursor evolution. Gas phase chemistry uses flamelet progress variable approach with an additional enthalpy dimension to include soot radiation effect. The developed numerical model is tested on the DLR swirl combustor that emulates the rich-quench-lean (RQL) configuration using secondary oxidation air injection.

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