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**LES-Based Analysis of Entropy Generation in a Turbulent Nonpremixed Flame** MEHDI SAFARI, REZA H. SHEIKHI, Northeastern University, NUCEC TEAM — Entropy generation analysis is an effective means of improving the efficiency of turbulent combustion from the second law of thermodynamics standpoint. Large eddy simulation (LES) of turbulent reacting flows is conducted with inclusion of entropy transport. The filtered form of this equation includes irreversible losses by entropy production due to viscous dissipation, heat conduction, mass diffusion and chemical reaction, all of which appear as unclosed terms. The closure is provided by a novel methodology entitled scalar, entropy filtered density function (SEn-FDF). The SEn-FDF describes the transport and generation of entropy, and is governed by an exact transport equation. This equation is modeled by a set of stochastic differential equations, which is solved by a Lagrangian Monte Carlo method. The main advantage of the SEn-FDF is that it provides closure for all individual entropy generation modes. It also includes the effects of chemical reaction in closed forms. The methodology is applied to a turbulent nonpremixed jet flame (Sandia Flame D) and predictions are assessed against experimental data. Entropy generation modes are obtained from the SEn-FDF and analyzed.

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