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LES of combustion dynamics near blowout in a realistic gas-turbine combustor LUCAS ESCLAPEZ, MEDHI B. NIK, PETER C. MA, JEFF O'BRIEN, SERENA CARBAJAL, MATTHIAS IHME, Stanford University
— Driven by increasingly stringent emission regulations, modern gas turbines operate at lean conditions to reduce combustion chamber temperature and NO_x emissions. However, as the combustor operates closer to the lean blow-out (LBO) limit, flame stabilization mechanisms are weakened, which increases the risk for complete flame blowout. To better understand the LBO-process, large-eddy simulations of the combustion dynamics near blowout are performed in a realistic two-phase flow combustor. An unstructured incompressible Navier-Stokes solver is used in combination with a Lagrangian dispersed phase formulation. Flame dynamics near and at LBO conditions are studied to identify the role of the liquid fuel composition, spray evaporation, and complex flow pattern on the LBO limit.

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