

Abstract Submitted
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Influence of Aerodynamic Strain Rate on Local Extinction in Turbulent Non-premixed Jet Flames¹ ARAVIND RAMACHANDRAN, VENKATESWARAN NARAYANASWAMY, KEVIN LYONS, North Carolina State University — 2-D velocity field measurements obtained from Particle Image Velocimetry (PIV) are used to obtain aerodynamic strain rate information in regions of local extinction in lifted turbulent non-premixed methane jet flames in coflow. Diluting the coflow to reduce the oxygen molefraction results in increased occurrences of local extinction. Statistical analysis is performed to correlate regions of high local strain rate with local extinctions in both air coflow and diluted coflow cases to study the influence of strain rate against vortical structures in extinguishing the flame front. A comparison is also made with heated and vitiated coflow cases, where autoignition is a flame stabilization mechanism and influenced by local strain rate. At high jet exit velocities ($U_x \gg U_r$), the out-of-plane strain rate component can be neglected but the convection of extinguished pockets into the measurement plane needs to be resolved by stereoscopic (3-D) measurements which will be done in a future work.

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