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Simultaneous PIV/OH-PLIF measurements in the wake of a reacting jet in swirling vitiated crossflow PRATIKASH PANDA, Purdue University, MARIO ROA, University of California, Los Angeles, YASHOWARDHAN WAGH, ROBERT LUCHT, Purdue University — A reacting jet issuing into a swirling, vitiated cross flow was investigated as a means of secondary injection of fuel in a distributed combustion system. Rapid mixing and chemical reaction in the near field of the jet injection is desirable in this application. Current study present time resolved planar measurements within the wake of reactive jets using simultaneous 2D-PIV/OH-PLIF at a repetition rate of 10 kHz. Based on our analysis it is hypothesized that the shear layer and wake field vortices play a significant role in stabilizing a steady reaction front within the near wake region of the jet. The reactive jets were injected through an extended nozzle into the crossflow which is located in the downstream of a low swirl burner (LSB) that produced the swirled, vitiated crossflow. PIV measurements and OH-PLIF based flame visualizations were acquired simultaneously at three measurement planes along the cross-section of the jet. The time resolved measurements provided significant information on the evolution of complex flow structures and highly transient features like, local extinction, re-ignition, vortex-flame interaction prevalent in a turbulent reacting flow.

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