

Abstract Submitted
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Tomographic PIV study of boundary-layer flashback in swirl flames DOMINIK EBI, NOEL CLEMENS, The University of Texas at Austin — Preventing boundary layer flashback in swirl combustors is a key challenge for gas turbines intended to burn high hydrogen content fuels. We are studying this type of flashback by investigating the upstream flame propagation of lean-premixed methane/hydrogen-air flames inside the mixing tube of our model swirl combustor. Experiments are conducted at atmospheric pressure. Flashback is triggered by increasing the equivalence ratio. Previous studies employing planar measurements have shown that the flame strongly alters the upstream flow field and thus its own propagation path. Volumetric measurement techniques are needed to further increase understanding of this highly three-dimensional coupled flow-flame interaction. Flashback is an inherently transient event with duration on the order of a few hundred milliseconds. Time-resolved tomographic PIV together with high-speed chemiluminescence imaging is therefore applied to investigate the velocity field in the vicinity of the flame.

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