Effects of Injection Scheme on Rotating Detonation Engine Operation¹ FABIAN CHACON, JAMES DUVALL, MIRKO GAMBA, Univ of Michigan - Ann Arbor — In this work, we experimentally investigate the operation and performance characteristics of a rotating detonation engine (RDE) operated with different fuel injection schemes and operating conditions. In particular, we investigate the detonation and operation characteristics produced with an axial flow injector configuration and semi-impinging injector configurations. These are compared to the characteristics produced with a canonical radial injection system (AFRL injector). Each type produces a different flowfield and mixture distribution, leading to a different detonation initiation, injector dynamic response, and combustor pressure rise. By using a combination of diagnostics, we quantify the pressure loses and gains in the system, the ability to maintain detonation over a range of operating points, and the coupling between the detonation and the air/fuel feed lines. We particularly focus on how this coupling affects both the stability and the performance of the detonation wave.

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