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Quasi-dual-mode behavior in the combustor of the HyShot scramjet JOHAN LARSSON, University of Maryland, RONAN VICQUELIN, Ecole Centrale Paris, JULIEN BODART, Universite de Toulouse, ISAE, IVAN BERMEJO-MORENO, Center for Turbulence Research, STUART LAURENCE, University of Maryland — The flow in the HyShot scramjet combustor is studied using wall-modeled LES with a flamelet combustion model. The focus is on the qualitative changes in the flow structure as the fuel/air equivalence ratio (ER) is increased. For low ERs, an essentially linear pressure-rise is found, consistent with fully supersonic combustion. For higher ERs, a qualitatively different yet stable flow develops, with a stronger shock-train towards the end of the combustor. This shock-train is analogous to what occurs in the isolator in dual-mode operation, but is lodged within the region of heat release, with a position that depends on the ER; this is consistent with recent experimental data obtained by Laurence et al at the German Aerospace Center (DLR).

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