IAF SPACE PROPULSION SYMPOSIUM (C4)
Hypersonic Air-breathing and Combined Cycle Propulsion, and Hypersonic Vehicle (7)

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FLAME STABILIZATION IN SUPERSONIC COMBUSTORS

Abstract

in the present computational study, the impact of cavity and strut positions on the combustion efficiency are investigated in a supersonic combustor. an experimentally investigated model combustor developed at the german aerospace center (dlr) is simulated and validated. then, a model combustor with struts and cavities placed at different positions is investigated. two-dimensional, compressible, reacting-flow governing equations are solved along with single step chemistry reaction and k- sst turbulence model using a commercial cfd code fluent. the oblique shock from the struts has a profound influence on the mixing and combustion process. the h2o mole fraction, h2 mole fraction contours, and combustion efficiency of various configurations are compared for finding better mixing and flame stabilization. the combustion efficiency reduces when the two struts are located in farther downstream or placed at the same downstream location. at higher mach numbers the combustion is delayed, and the mixing of fuel with the supersonic mainstream is incomplete.