Abstract Submitted
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Dynamics of flame development at early stages of combustion inside a reverse-flow power generator model combustor[1] ZAHRA MOLLAHOSEINI, RAMIN HEYDARLAKI, University of British Columbia, PETER KOSTKA, WILLIAM AITCHISON, Etalim Inc., SINA KHEIRKHAH, University of British Columbia — Effects of reverse-flow configuration on characteristics of premixed flame development inside a model combustor were investigated experimentally. Tests were performed for lean CH_4-air flames with bulk flow velocities of 4.0 and 6.4 m/s. High-speed OH* chemiluminescence imaging synchronized with pressure measurements were performed. The results suggest, prior to appearance of thermoacoustics, three phases, namely, ignition, stabilization, and transition are observed. During the ignition phase, the normalized flame edge velocity can achieve relatively large maximum values owing to the reverse-flow configuration compared to that for closed chambers. The ignition phase is followed by the stabilization phase during which a Bunsen flame is formed on the flame-holder. During the transition phase, the flame chemiluminescence features a long-period sinusoidal oscillation, during which the flame is partially-detached from the holder. Despite significant influences of the reverse-flow configuration on flame dynamics during the ignition and stabilization phases, the spectral characteristics of pressure and flame chemiluminescence oscillations are not influenced by this configuration during the transition phase and are similar to those of unconfined flames.

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