

Abstract Submitted  
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**Study of Combustion Dynamics in a Swirl Gas Combustor<sup>1</sup>**

DEVKINANDAN TOKEKAR, URMILA GHIA, KARMAN GHIA, University of Cincinnati — Combustion in a lean pre-mixed (LPM) combustor may become unstable due to small changes in geometry and the manner in which reactants are introduced. This may lead to excessive thermal loads and possible off-design operation. A comprehensive understanding of combustion instability is therefore needed. Hence, the present study aims to analyze the flow and flame dynamics in a model LPM gas turbine combustor and investigate the causes for combustion instabilities arising in LPM combustion. Fluent is used as the flow solver for the present study. The 3-D Navier-Stokes equations are solved along with finite-rate chemical reaction equations and variable thermophysical properties. Large-eddy-simulation technique is used to model turbulence. The dynamic version of the Smagorinsky-Lilly model is employed to describe subgrid-scale turbulent motions and their effect on large-scale structures. A non-reacting flow simulation is performed first, and the results show good agreement with published experimental and numerical work. Presently, the reacting flow analysis is in progress to determine the effect of equivalence ratio and inlet flow temperature on the stability characteristic of the combustor.

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