

Highly-resolved large eddy simulation of the nonreacting flow in an asymmetric vortex combustor

Abstract

In this paper, we present a computational investigation of the nonreacting flow structure inside a novel asymmetric vortex combustor that was recently proposed by the authors. Large Eddy Simulation using the Smagorinsky-Lilly subgrid turbulence closure has been used to study such flow. A computational grid of 2.22×10^6 cells was used to ensure that the resolved turbulence kinetic energy is fairly more than 80% of the total turbulence kinetic energy budget. The flow was found to exhibit a central recirculation zone, and two secondary recirculation zones in the asymmetry regions. The vortex structure was found to be a completely forced vortex field. The effect of turbulence on the size and structure of the statistically averaged mean flow phenomena has been analyzed as discussed.