Combustor aerodynamic using radial swirler.

ABSTRACT

A study has been conducted to investigate the flow pattern in a gas turbine combustion chamber by simulation and experimental approaches. Flow pattern inside a combustor is important to self sustain the flame, increase mixing of air and fuel, and increase combustion intensity. Aerodynamically curved vanes allow the incoming axial flow to turn gradually. This inhibits flow separation on the suction side of the vane. Thus, more complete turning and higher swirl and radial-velocity components can be generated at the swirler exit with the added advantage of lower pressure loss. The swirl number varied from 0.49, 1.29 and 2.29 for flat vanes and only 1.57 for curved vane. The highest swirl number of 2.29 for flat vane and 1.57 for curve vane are capable of creating a clear reversal mass flow rate zone and higher swirl strength reduces the corner recirculation zone size and hence reduces the negative impact on the combustion process and the homogeneity of the wall temperature as well. Further investigation can be done for higher swirl number for both types of swirler.

Keyword: Radial swirlers; Recirculation zone; Swirl number; Flat vane; Curved vane.