# A multiple inlet swirler for gas turbine combustors

## Abstract

The central recirculation zone (CRZ) in a swirl stabilized gas turbine combustor has a dominant effect on the fuel air mixing process and flame stability. Most of state of the art swirlers share one disadvantage; the fixed swirl number for the same swirler configuration. Thus, in a mathematical sense, Reynolds number becomes the sole parameter for controlling the flow characteristics inside the combustor. As a result, at low load operation, the generated swirl is more likely to become feeble affecting the flame stabilization and mixing process. This paper introduces a new swirler concept which overcomes the mentioned weakness of the modern configurations. The new swirler introduces air tangentially and axially to the combustor through tangential vanes and an axial vanes respectively. Therefore, it provides different swirl numbers for the same configuration by regulating the ratio between the axial and tangential flow momenta. The swirler aerodynamic performance was investigated using four CFD simulations in order to demonstrate the impact of tangential to axial flow rate ratio on the CRZ. It was found that the length of the CRZ is directly proportional to the tangential to axial air flow rate ratio.