

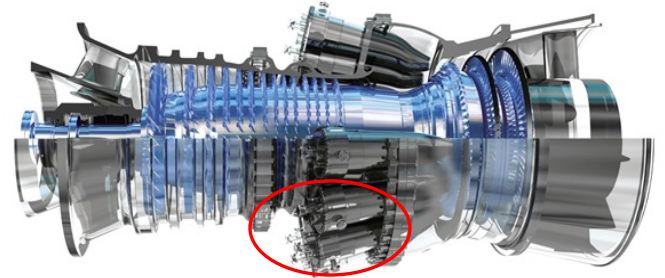


Objective

Investigate the aerothermal behavior in the dump diffuser and the reversed-flow combustor with and without jet impingement sheath to achieve more effective cooling and reduced aerodynamic losses.

Reverse-flow Combustor Advantages

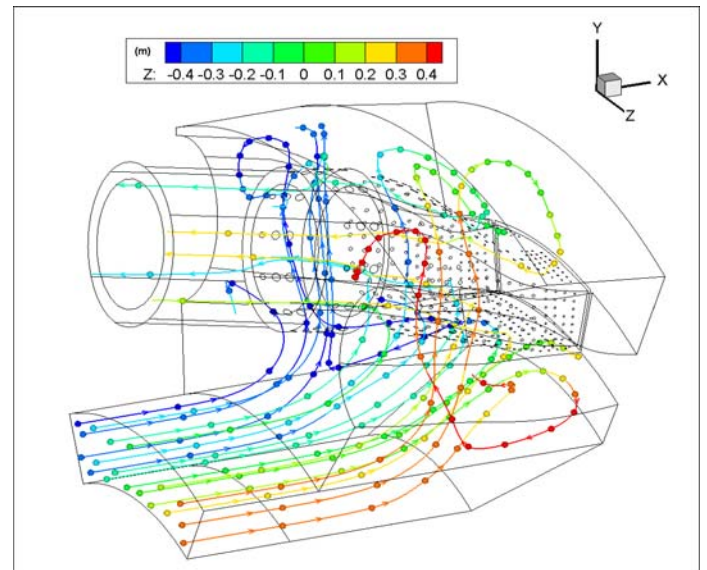
- Reverse-flow combustor can reduce the length of the gas turbine and make the transportation much easier.
Reduced length will allow single shaft sitting on two bearings instead of three. This will reduce the vibration and maintenance problems.
The reverse-flow layout effectively uses the air flow to cool down the combustor liner and the transition piece as a counterflow heat exchanging process.
The reverse-flow process also allow warmer air to serve as the dilution air to control the NOx formation instead of using other energy to preheat the dilution air or use cold air which could quench the flame and produce CO.
Similarly, the preheat air also serves as wall jet film cooling on inside of the combustor liner.



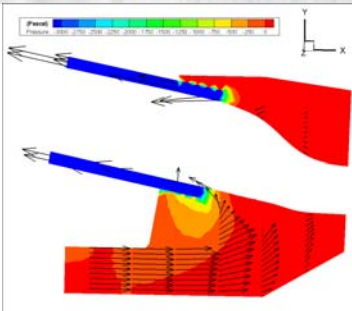
GE 7FA Gas Turbine



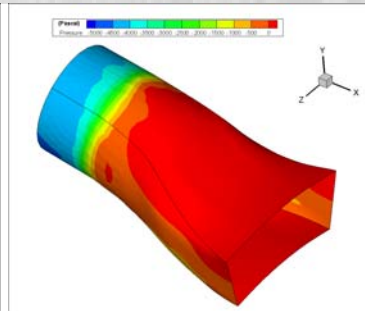
1/7th sector of dump diffuser-combustor



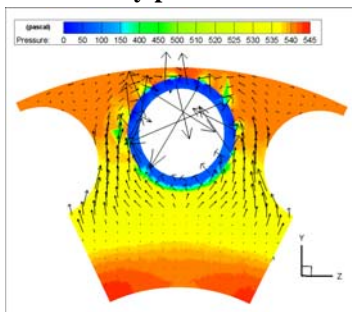
Pathlines



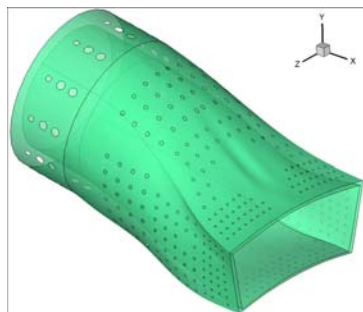
Mid-plane velocity vector colored by pressure



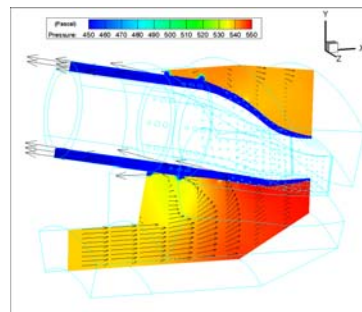
Pressure contour without sheath



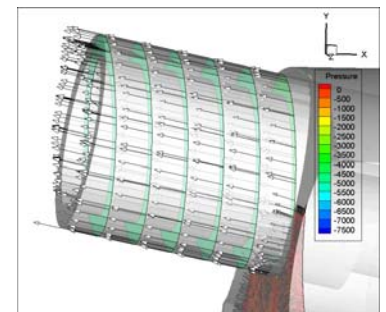
End-view of velocity vector And pressure contour



Combustor employing outer sheath with impinging jet cooling holes



Mid-plane velocity vector and pressure contour



Cut-away view of velocity vectors and pressure contour in the top hat of combustor