

Progress and development of Coanda jet and vortex cell for aerodynamic surface

ABSTRACT

Coandă jet has always been referred to in the consideration of various flow control methods to enhance aerodynamic performance, i.e. to enhance lift, reduce drag and delay stall at higher angle of attack, along with continuous, synthetic and pulsed jets, compliant surface, vortex-cell, and the like. Coandă jet has also been applied in the development of novel aircrafts for short take off, while another circulation enhancement technique known as Trapped Vortex Cavity (TVC) is currently being given significant considerations. It is with such motivation that within the aerodynamics surface blowing techniques, Coandă jet and vortex-cell will be reviewed, to assess their characteristics in dramatically alter the behavior of aerodynamic components such as airfoils, wings, and bodies. Capitalizing on a host of research and technology development efforts on Coandă and surface blowing circulation enhancement, the present work reviews the influence, effectiveness and configuration of airfoil surface blowing of Coandă-jet and Trapped Vortex Cavity in circulation enhancement and control of aerodynamic surfaces. The crux of the TVC active research is their stabilization, while Coandă enhanced lift enhancement technique has, to a certain extent reached a stage that it can be easily implemented with advantage.

Keyword: Aerodynamic surface blowing; Coandă effect; Circulation control; Lift augmentation; Trapped vortex cell