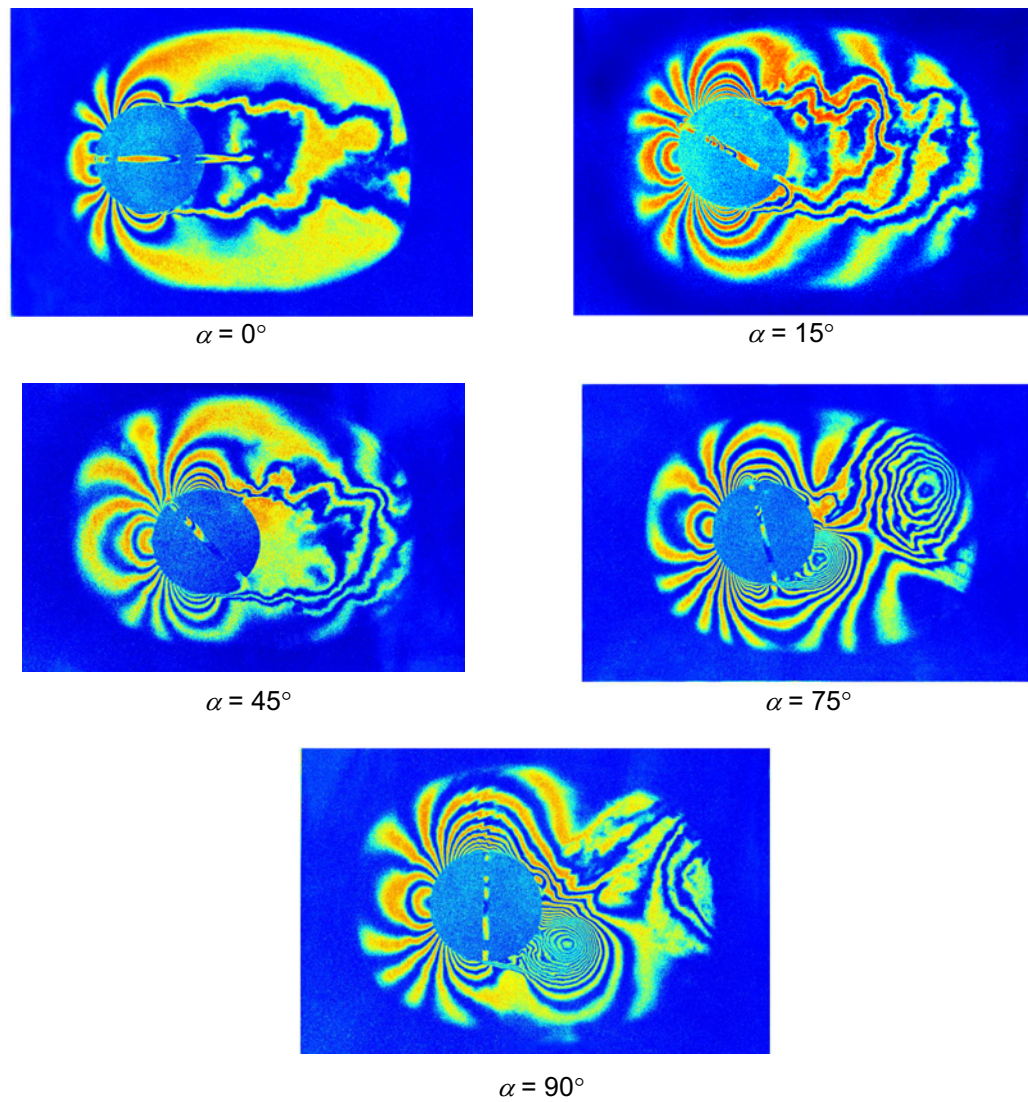


Vented Circular Cylinder as a Vortex Generator

Suryanarayana, G. K.¹⁾, Meier, G. E. A.²⁾ and Pauer, Henning²⁾

1) National Aerospace Laboratories, Bangalore, India. E-mail: surya@ntaf.cmmacs.ernet.in

2) DLR Institute of Experimental Fluid Mechanics, Goettingen, Germany.



These Mach-Zender interferograms show the effect of slot incidence on the near-wake features of a circular cylinder with natural ventilation. When the slot incidence angle is varied in the range 60° to 90° with respect to the mean flow, dramatic change in the flow features can be observed, as compared to the basic cylinder. Alternate blowing and suction take place across the slot, resulting in the formation of huge vortices accompanied by generation of sound. Due to the very low pressures in the core of the vortex leaving the near wake flow-field, the instantaneous flow remains attached up to 180° from the stagnation point. At $\alpha = 60^\circ$, significant difference in the locations of mean separation lines on top and bottom sides was seen, suggesting production of lift. The interferograms were obtained at free-stream conditions of $M = 0.31$ and $Re = 0.47$ million at the 0.3 m vacuum wind tunnel at the Max-Planck Institute of Fluid Mechanics, Goettingen, Germany. The cylinder diameter was 50 mm, and the vent slot had dimensions of 4 mm at the entrance and 4 mm at the exit.