

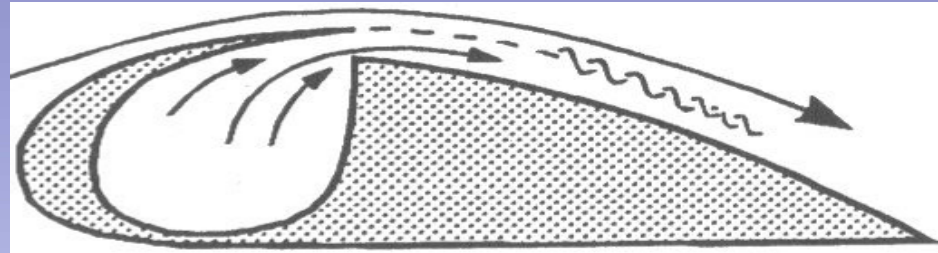
# A PARAMETRIC STUDY OF A PLANE WALL JET

## Background

Wall jets have a maximum velocity near the wall, which differs from most flows. Applications include heat transfer, film coating, and flow separation control. The effect of inlet conditions on the structure of wall jets has not been rigorously tested.

## Objective

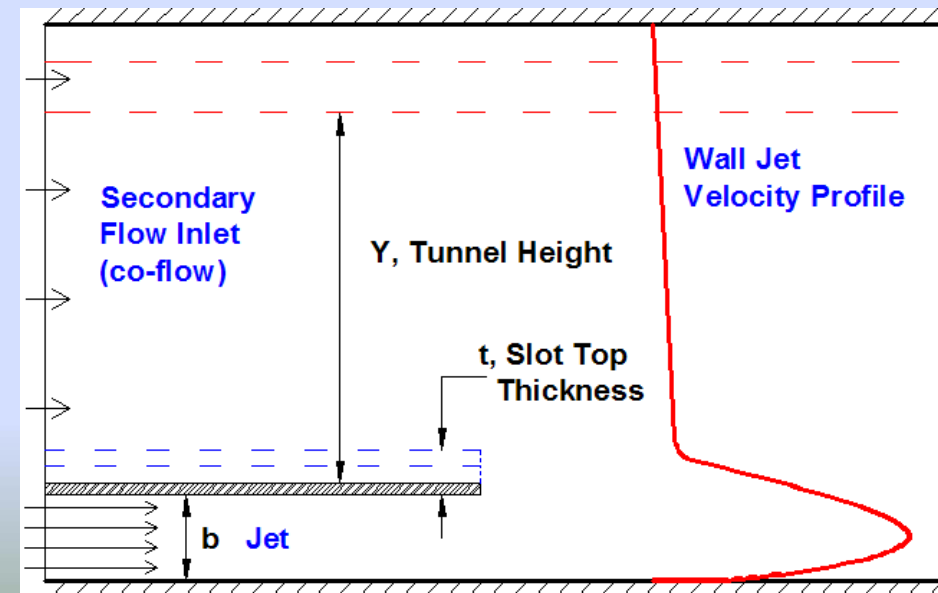
To study the effect of inlet parameters ( $Y$  and  $t$ ) on downstream velocity and turbulence profiles.



*Wall jet control of boundary layer separation on a wing (Schlichting 2000)*



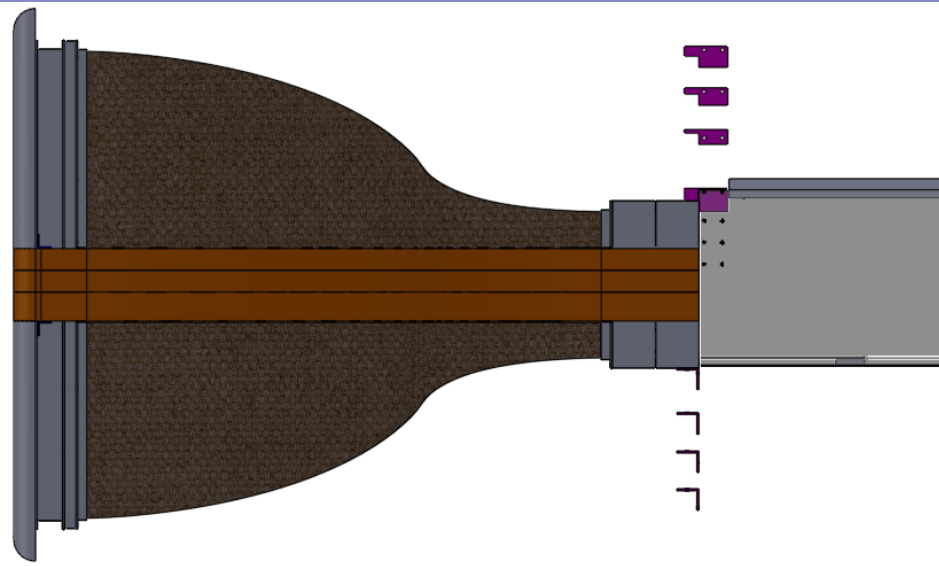
*Grumman HU-16A 'Albatross' aircraft (USAF)*



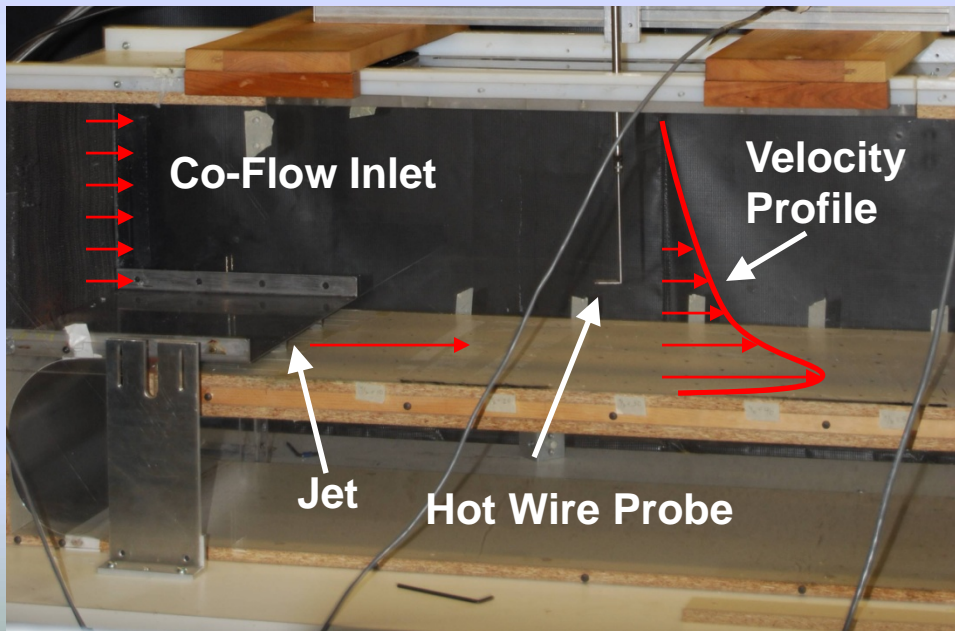
*Parameters to be varied ( $t$ ,  $Y$ )*

## Research Carried Out

- Literature review to choose range of  $Y$  and  $t$
- Incorporated varying  $Y$  and  $t$  into tunnel design
- Validated hot-wire measurement system for collecting turbulence data



*Inlet cone for flow conditioning (Brown spacers for varying 'Y', purple for varying 't')*



*Wall jet wind tunnel facility*

## Expected Outcomes

- Correlation of studies that do not use similar  $Y$  and  $t$
- Effect of  $Y$  and  $t$  on jet penetration into co-flow (e.g. efficient film cooling)
- Evaluation of accuracy of similarity solution