# Juncture Flow Wall Rake Data

in NASA Langley 14- by 22-foot subsonic tunnel

Compiled by Chris Rumsey and Judi Hannon
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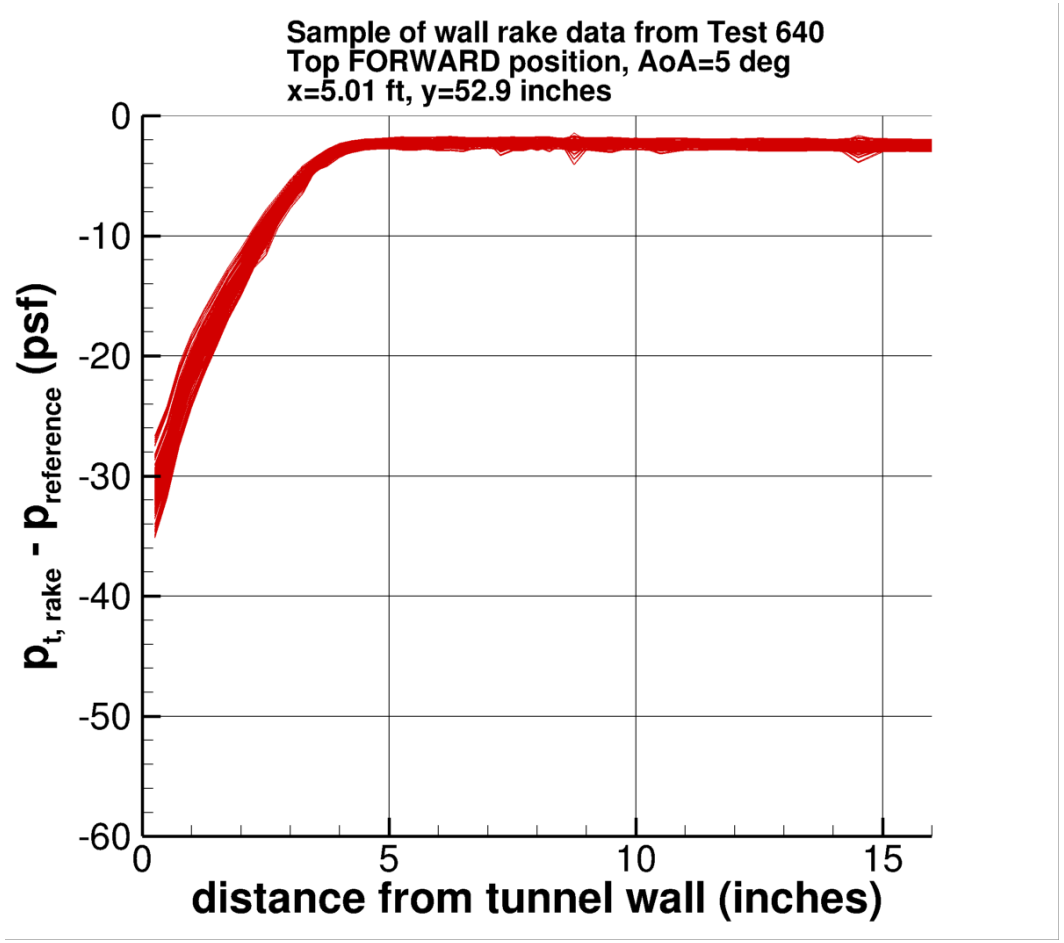
# Introduction

- 3 wall rakes were used during the Juncture Flow (JF) test
  - One rake was always positioned on the ceiling
  - Others on side walls, in a few different positions (changed during test)
  - JF model was in the tunnel (two different incidence angles, upright position)
- Rakes are approx. 16 inches high
- Rakes measure a pressure difference, $\Delta p$
  - $\Delta p$ is the difference between the local wall rake total pressure and a reference pressure ($\Delta p = p_{t,rake} - p_{reference}$)
  - The $p_{reference}$ is offset somewhat from the measured tunnel plenum total pressure
    - This is why $\Delta p$ does not go to zero past the edge of the boundary layer
    - Details do not matter here, since our focus is on the boundary layer thickness, which is clear from the following plots

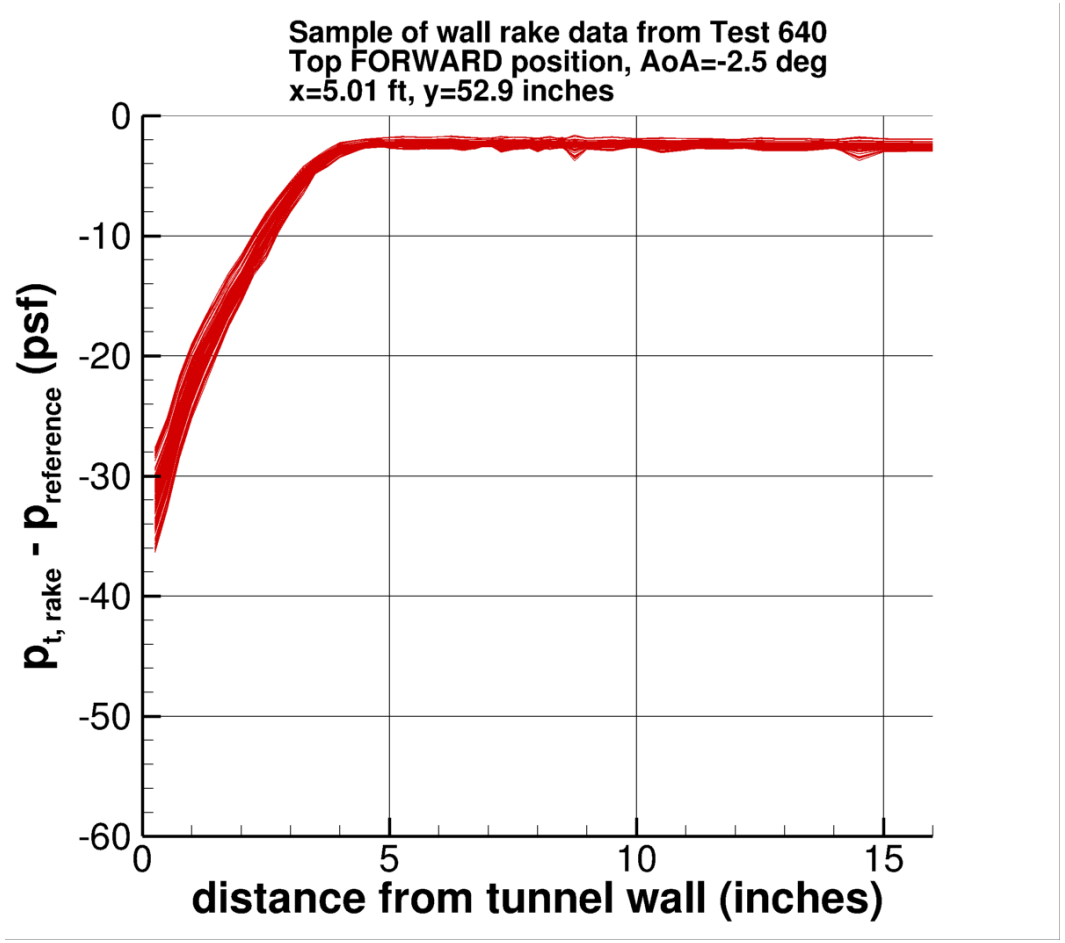
# Forward wall positions in front of model

# Top wall (Ceiling) FWD

AoA = 5 deg

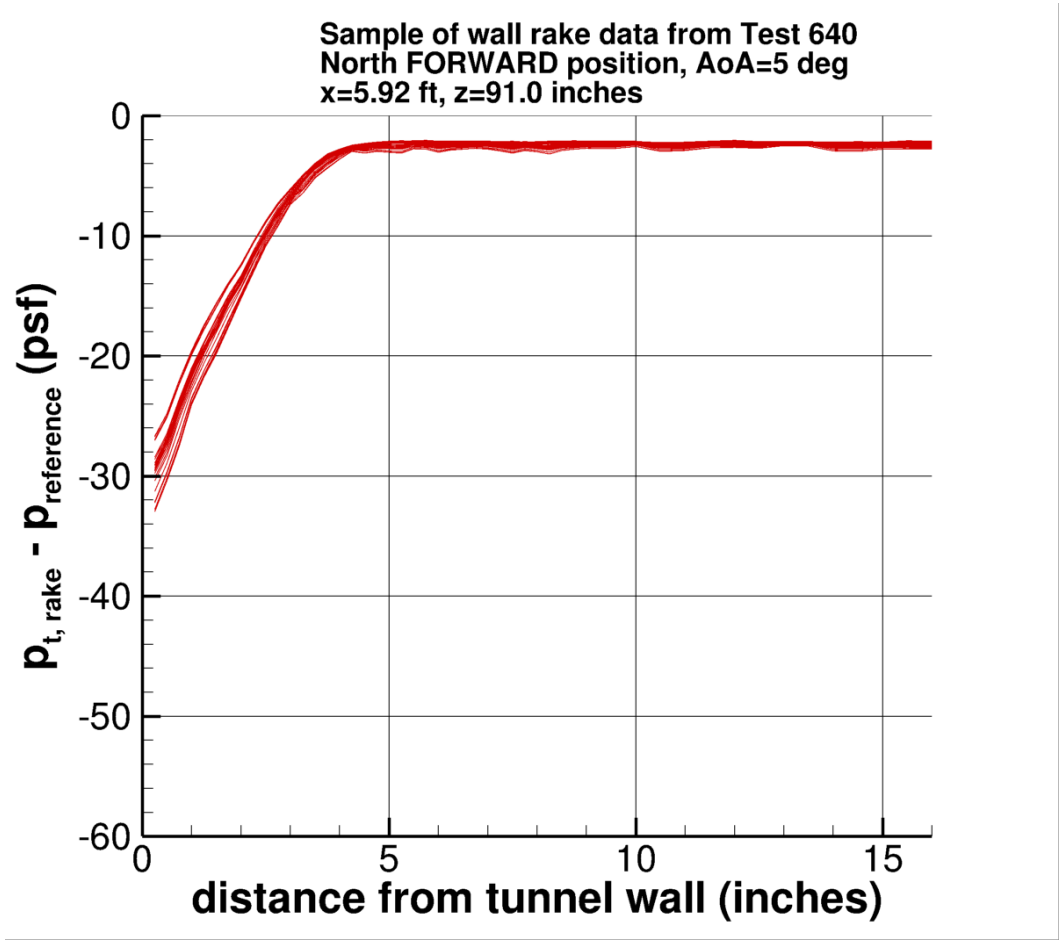



AoA = -2.5 deg

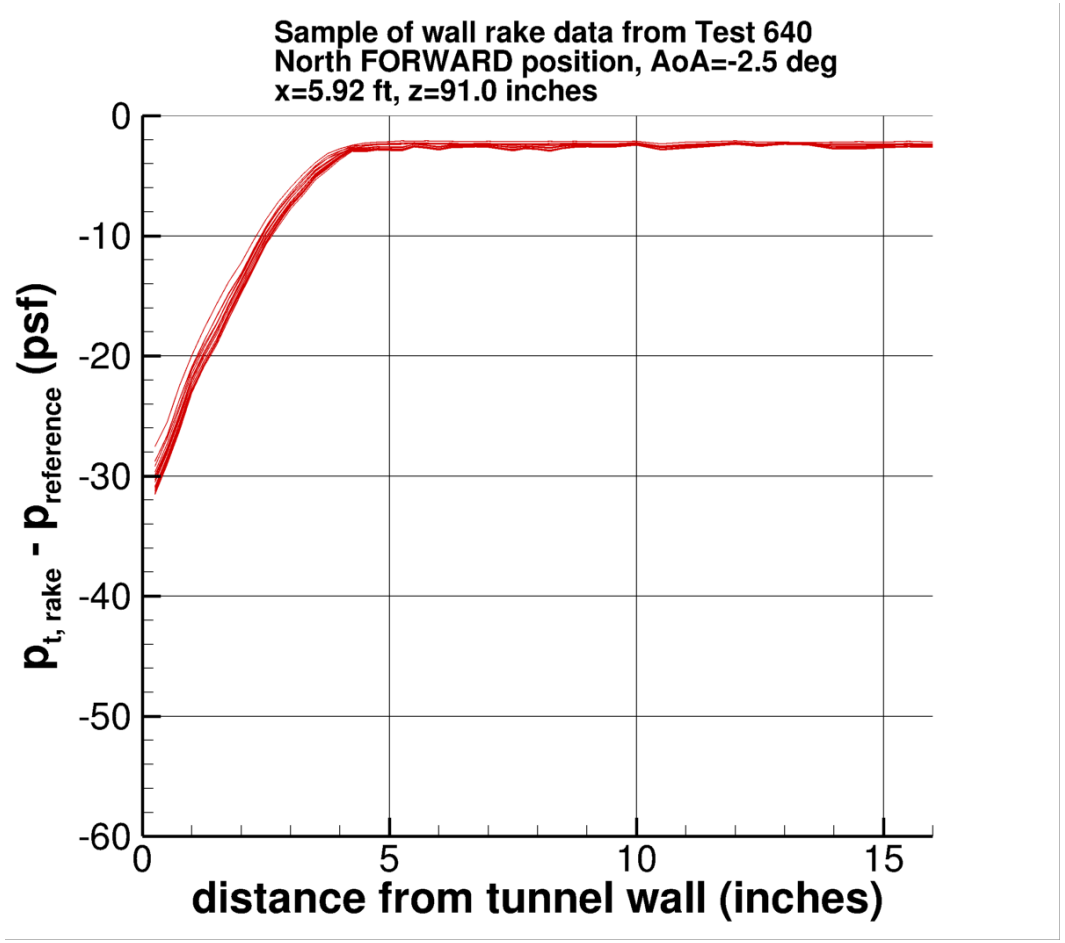


# North wall FWD (outer wall, to the left from pilot's view, facing forward)

AoA = 5 deg

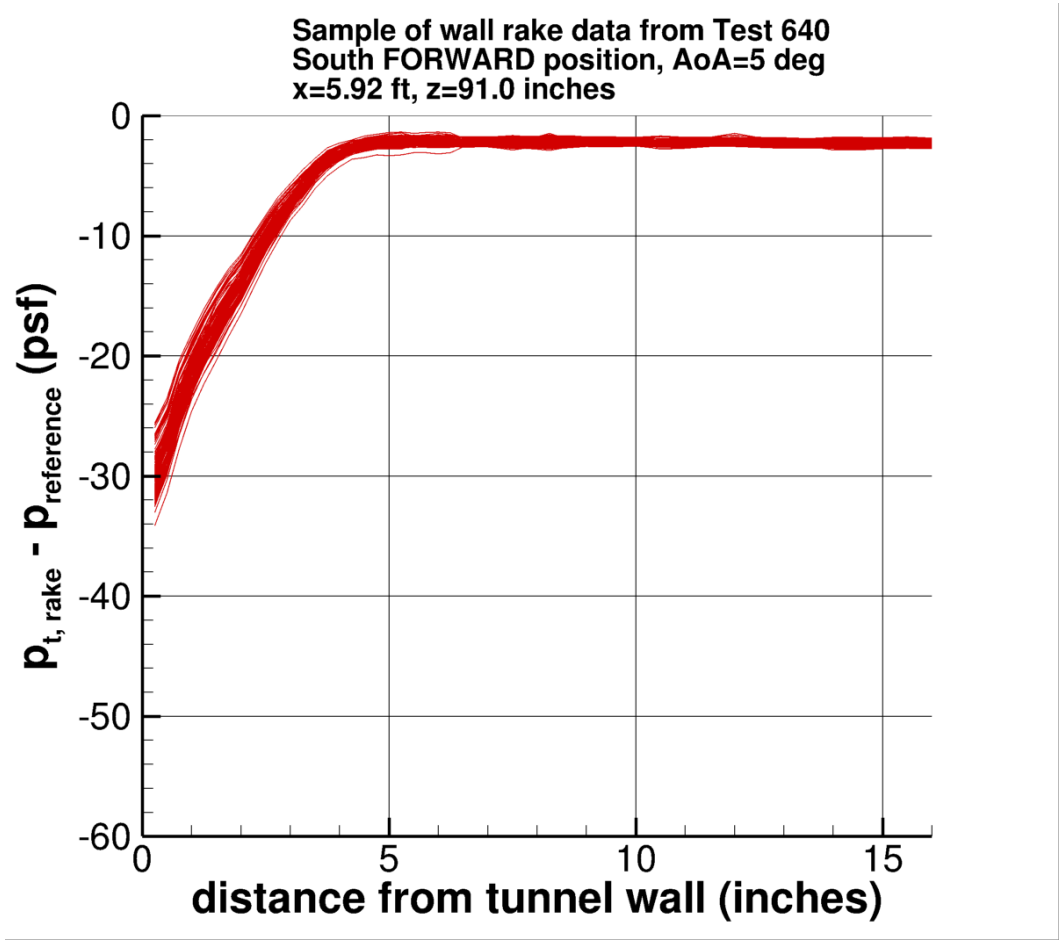



AoA = -2.5 deg

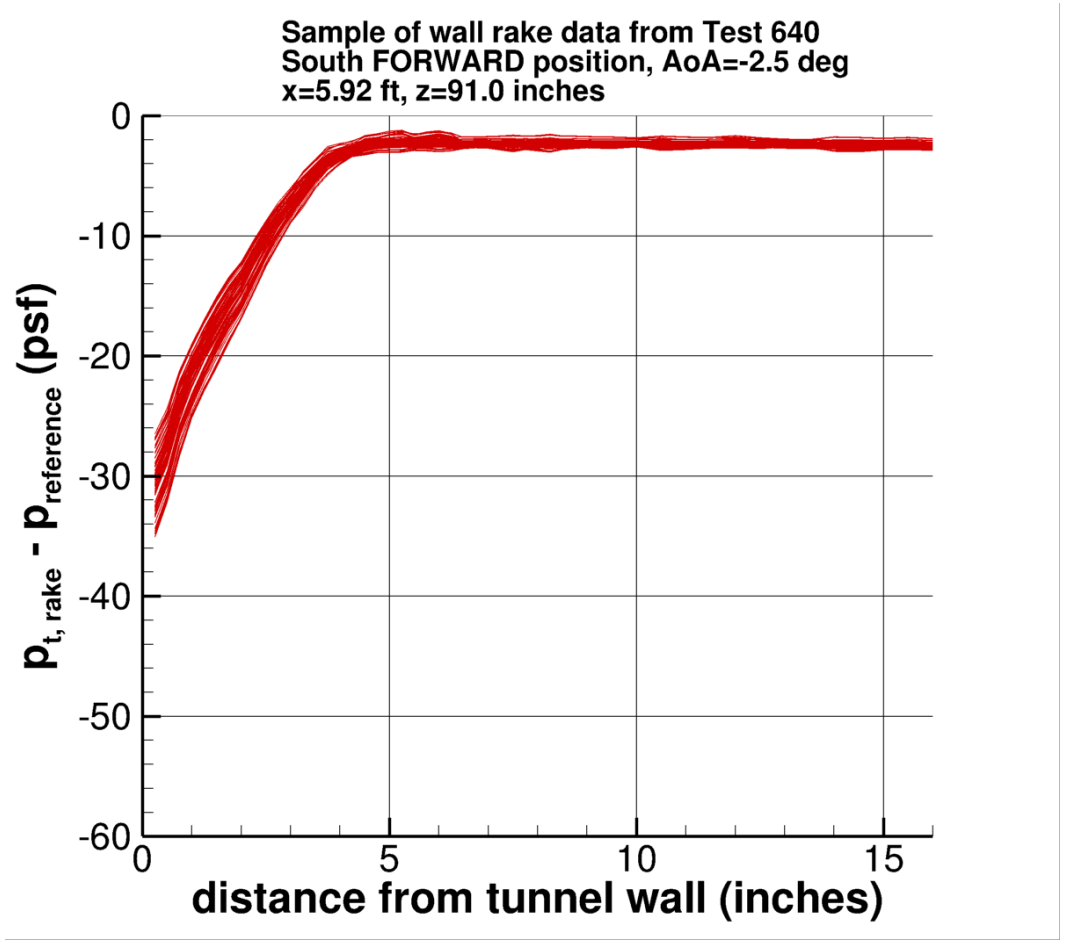


# South wall FWD (inner wall, to the right from pilot's view, facing forward)

AoA = 5 deg



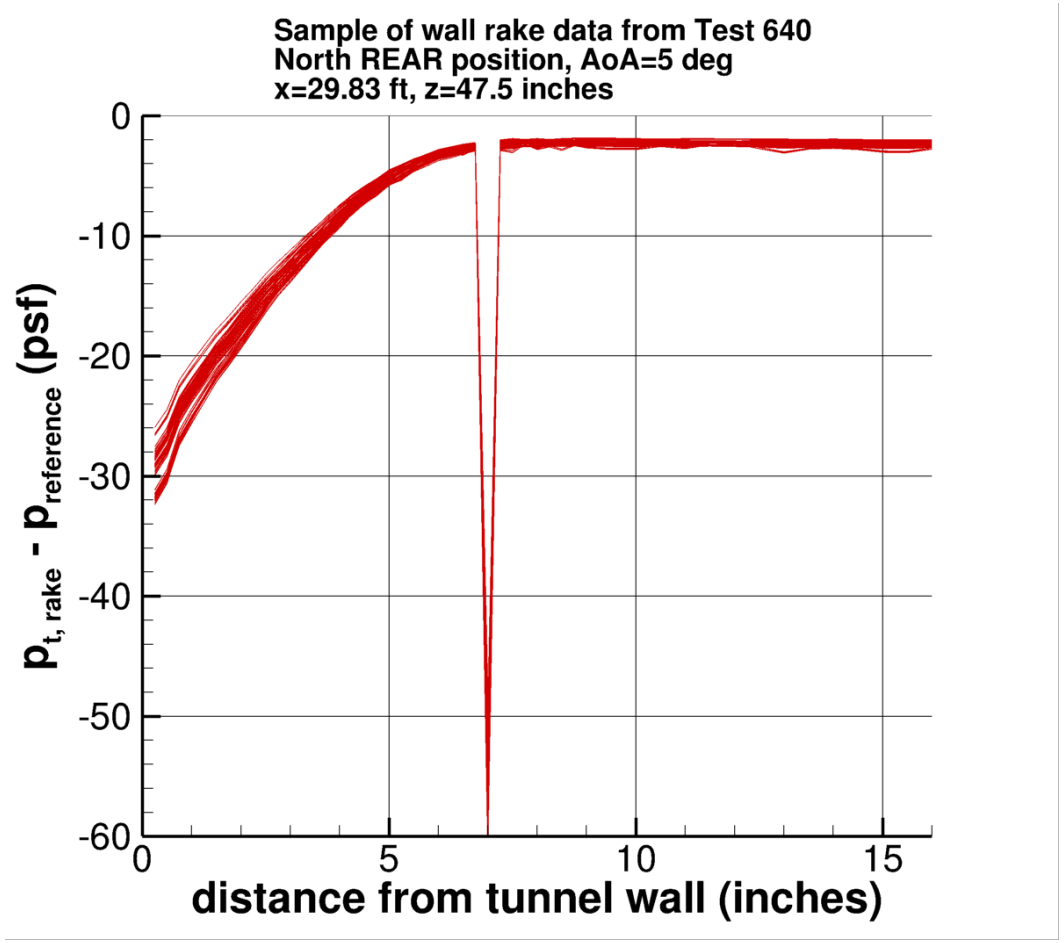

AoA = -2.5 deg



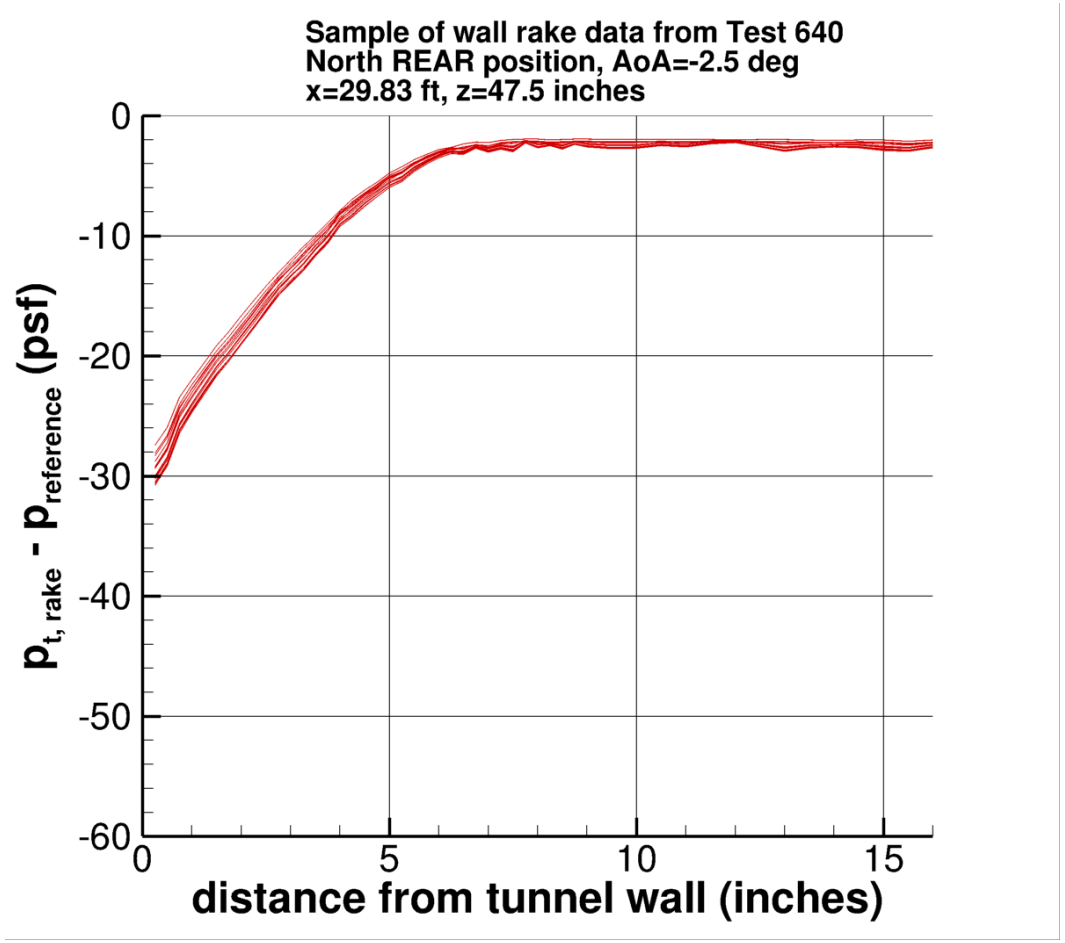
# Rear wall positions behind model

# North wall REAR (outer wall, to the left from pilot's view, facing forward)

AoA = 5 deg

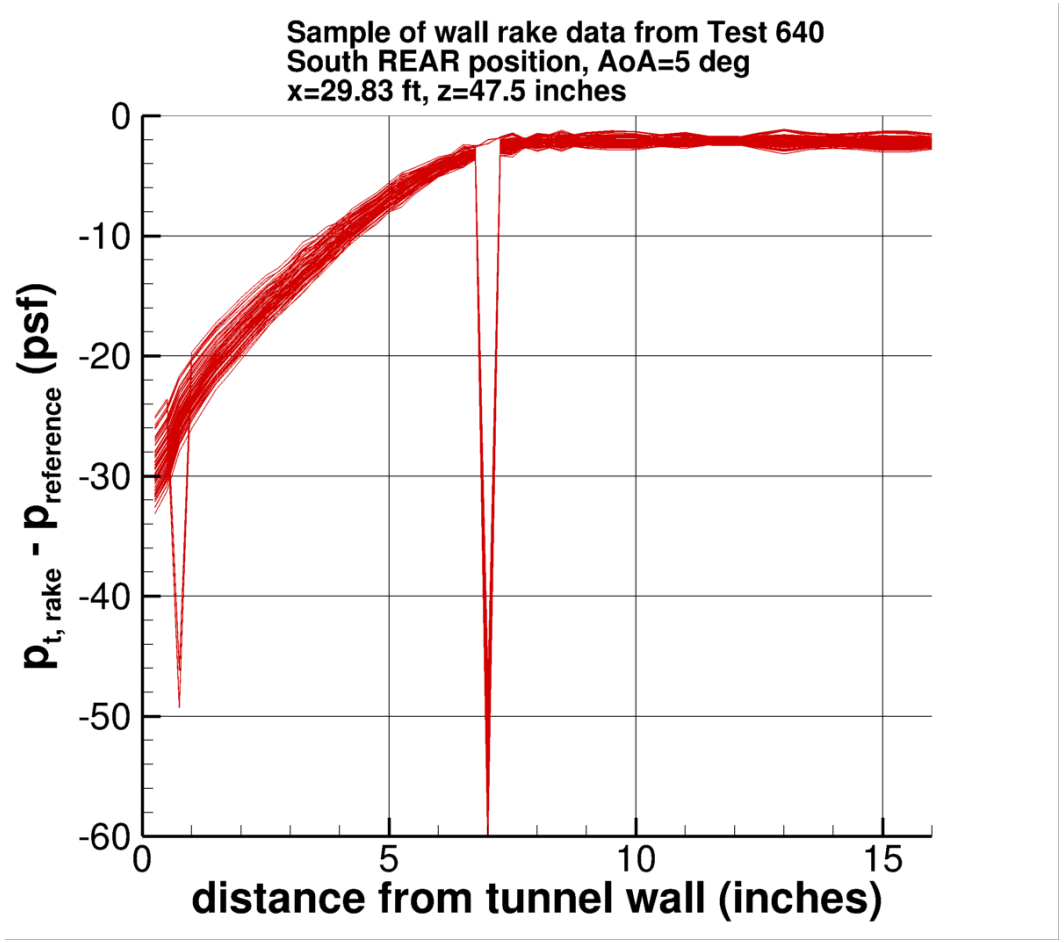



AoA = -2.5 deg

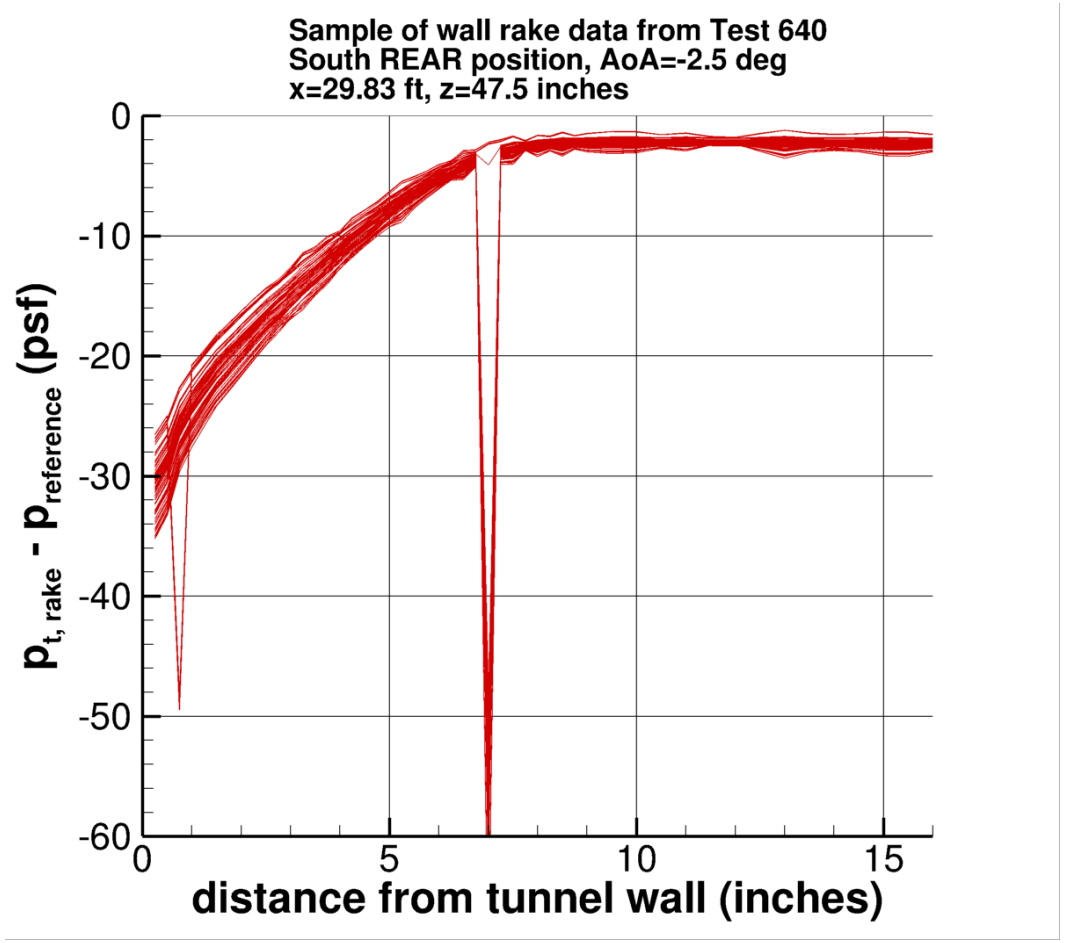


# South wall REAR (inner wall, to the right from pilot's view, facing forward)

AoA = 5 deg




AoA = -2.5 deg



# Summary

- At forward locations (x approx. 5-6 ft downstream of start of test section), wall BL thickness is approx. 4-5 inches at all three locations measured
  - These results have been compared to previous empty tunnel results (not shown), including measurements on tunnel floor with no boundary layer removal control
  - The results are consistent

- At rear locations (x approx. 30 ft downstream of start of test section), BL thickness has grown to approx. 7-8 inches at the two locations measured on the side walls
  - At this location, the presence of the model is known to have some effect on the side wall boundary layer