Inflow Information for Juncture Flow from the Quantitative Wake Survey System (QWSS) Tests

NASA Langley 14-by 22-Foot Subsonic Tunnel (14x22)

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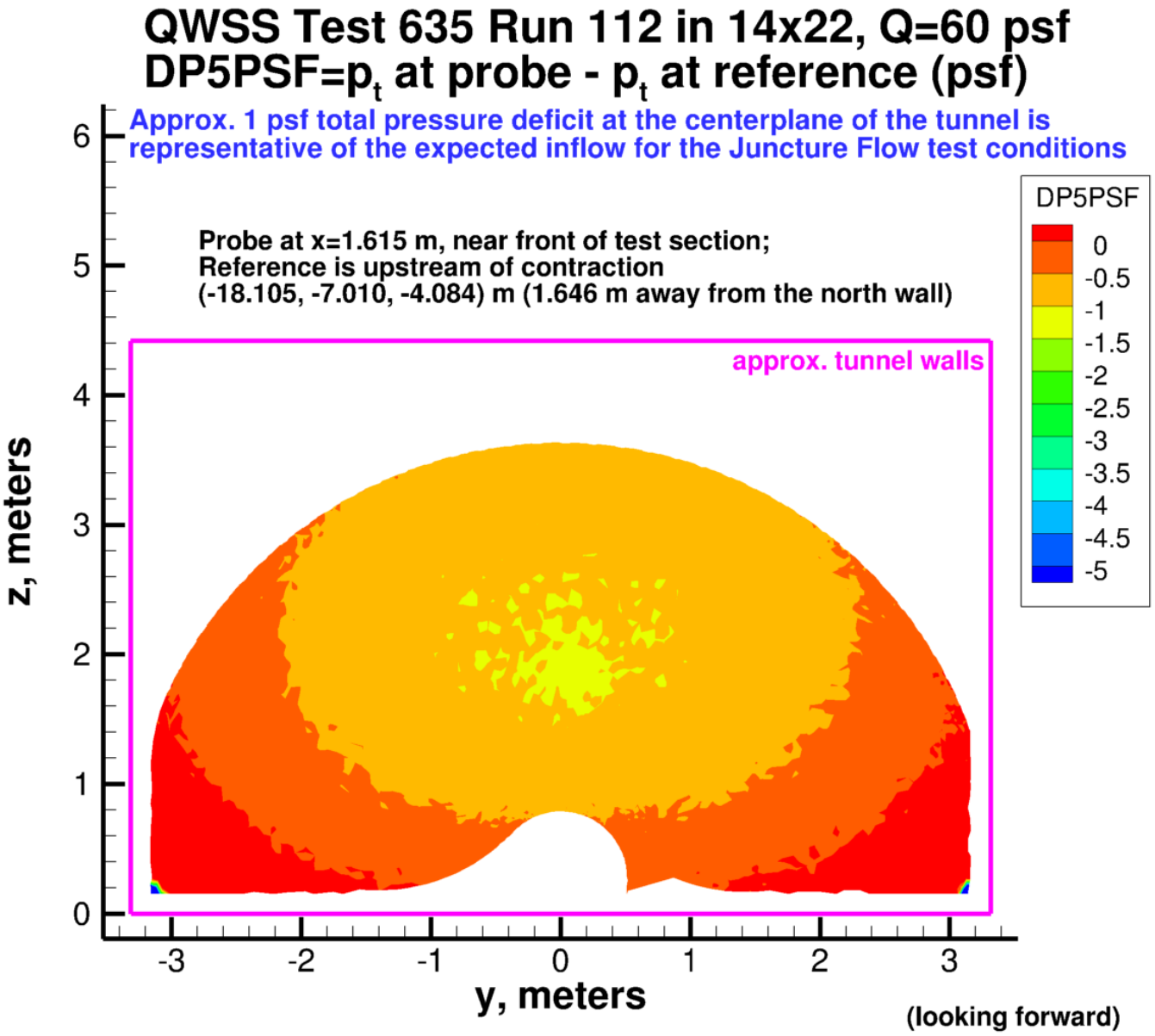
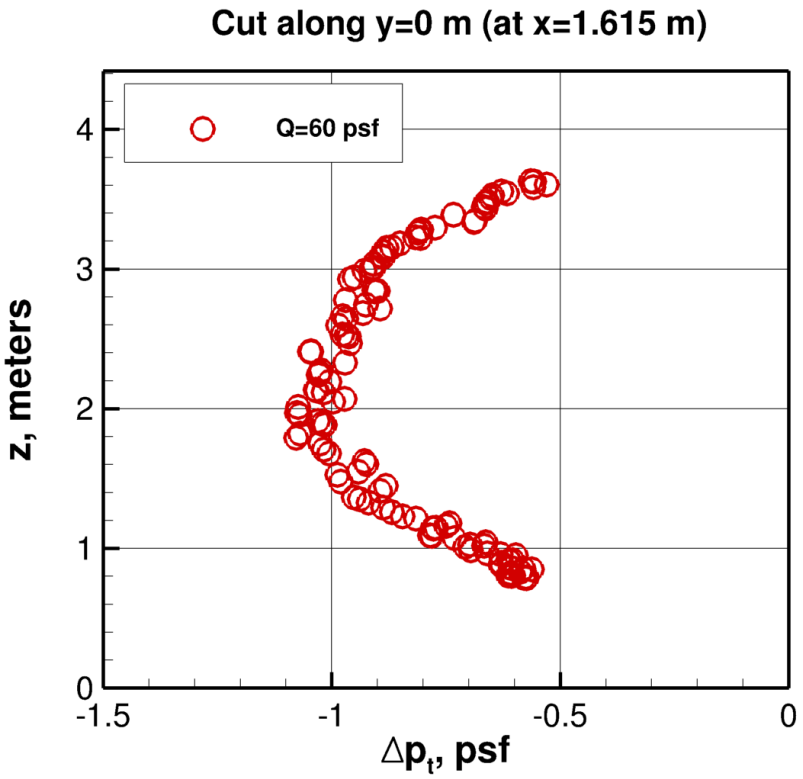
Introduction

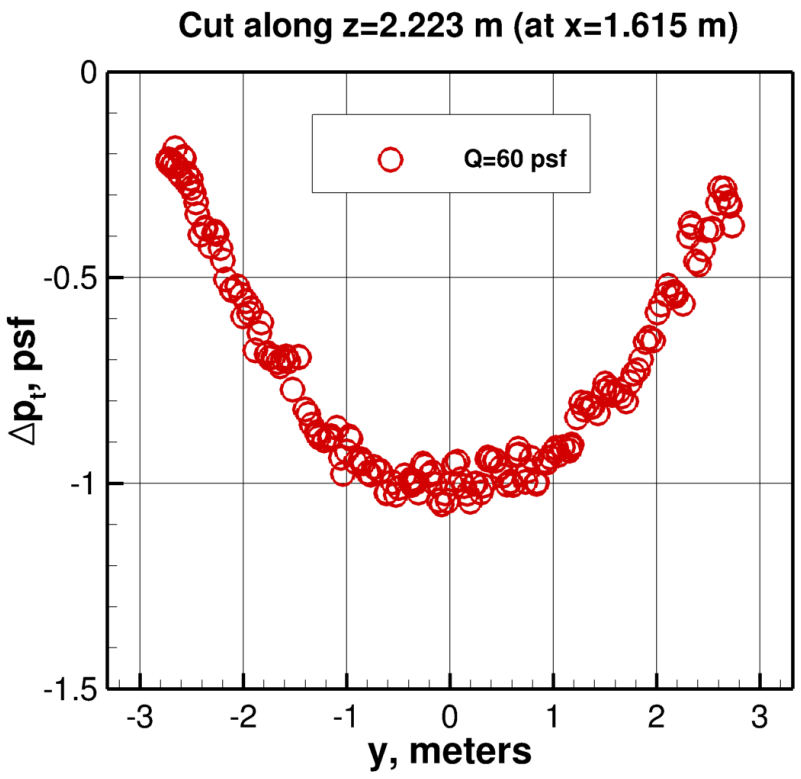
- Several tests (627, 628, and 635) were conducted in the 14x22 tunnel using Boeing's QWSS
  - In an effort to characterize the tunnel's inflow for the Juncture Flow (JF) tests
  - The plane measured was in the test section, at x=1.615 m
- See AIAA-2017-4126 for other relevant details

Total pressure



Total pressure extracted lines





Flow angularity

- Analysis of flow angularity (and other information from the QWSS data) is ongoing
- There were no clear trends showing major consistent flow angularity deviations
  - Angularity deviations from expected flow over most of the tunnel cross section were well less than 1 degree
  - But the accuracy of the QWSS angularity measurement is unclear; still under investigation

Summary

- At a dynamic pressure (Q) of 60 psf, there is approximately a 1 psf total pressure deficit near the center of the 14x22 tunnel
  - This number varies with Q
  - The JF test was conducted at Qs in the range of about 44-61 psf, so the expected total pressure deficit is probably somewhat less than 1 psf
- Although analysis is ongoing, flow angularity deviations in the tunnel appear to be relatively small
  - They had a minimal influence on model surface pressures in the JF test (one side of tunnel with model upright vs. other side of tunnel with model inverted)
  - Details can be found in “Model Pressures” data