

Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Implementation of Active Noise Control in a Closed-Circuit Wind Tunnel¹ MATTHEW KUESTER, EDWARD WHITE, Texas A&M University — Closed return wind tunnels, such as the Klebanoff–Saric Wind Tunnel (KSWT) at Texas A&M University, can provide relatively low freestream turbulence levels but include noise sources that do not exist in flight. This background noise, such as fan and motor noise, can adversely affect boundary-layer transition experiments if the frequencies are in the range of unstable Tollmien–Schlichting waves. Passive acoustic treatments eliminate most noise propagating downstream from the fan to test section in the KSWT, but measurements showed upstream-traveling tonal noise propagating from the fan into the test section. To eliminate this, an active noise control system utilizing an adaptive filter algorithm was implemented targeting frequencies in the TS band below the planar duct mode cut off. Multiple microphones are used to detect and cancel upstream traveling sound without affecting downstream traveling sound. Microphone measurements are used to document the noise reduction at multiple locations in the test section.

¹The authors gratefully acknowledge the support of NASA and AFOSR through AFOSR grant FA9550-09-1-0341. MSK also acknowledges the support of NASA/ASEE through a NASA Aeronautics Fellowship.

Matthew Kuester
Texas A&M University

Date submitted: 30 Jul 2010

Electronic form version 1.4