Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

Coupling Modes and Standing Waves in Supersonic Twin Rectangular Jets[1] ATA ESFAHANI, NATHAN WEBB, MO SAMIMY, Ohio State Univ - Columbus — The existence of standing waves (SWs) in the irrotational hydrodynamic field (IHF) of screeching underexpanded circular single and closely-spaced (C-S) twin jets has been reported in the literature as has coupling of C-S twin circular and large aspect ratio rectangular jets. SWs in the IHF are generated by the interaction of upstream travelling acoustic waves and downstream convecting hydrodynamic waves generated by the convection of large-scale structures in the jet's shear layer. A new experimental facility, using C-S supersonic twin rectangular jets with a design Mach number of 1.5 and an aspect ratio of 2, has recently been commissioned at the Gas Dynamics and Turbulence Laboratory at OSU. SWs and jet coupling have been investigated from overexpanded (M_j of 1.15) to underexpanded (M_j of 1.85) jets using 6 near-field microphones located along the common major axis and both minor axes of the nozzles and schlieren imaging. The preliminary results show out-of-phase coupling along the minor axis in overexpanded regime transitioning to in-phase coupling in underexpanded regime. In both coupling cases, weak coupling exists at low M_js but transitions to stronger coupling as M_j is increased. Well-defined SWs are observed in both regimes in the range of M_js at which both coupling strength and screech amplitude are increasing. More detailed work is underway.

[1]Research supported by ONR with Steve Martens

Mo Samimy
Ohio State Univ - Columbus

Date submitted: 10 Aug 2020 Electronic form version 1.4