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Simulations of High Speed Turbulent Jets in Crossflow[1] XIAOCHUAN CHAI, KRISHNAN MAHESH, University of Minnesota — Numerical simulations are used to study an under-expanded sonic jet injected into a supersonic crossflow and an over-expanded supersonic jet injected into a subsonic crossflow, where the flow conditions are based on Santiago *et al.*'s (1997) and Beresh *et al.*'s (2005) experiments, respectively. A finite volume compressible Navier–Stokes solver developed by Park & Mahesh (2007) for unstructured grids is used. The simulations successfully reproduce experimentally observed shock systems and flow vortical structures such as the barrel shock, Mach disk, horseshoe vortices that wrap up in front of the jet and the counter rotating vortex pair (CVP) downstream of the jet. The dynamics of these flow structures are discussed, as well as the influence of grid resolution and the effect of inflow turbulence. The time averaged flow fields are compared to the experimental results, and reasonable agreement is observed.

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