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Shock Train Analysis of Varying Deck Plate Configurations for a Multi Stream Rectangular Nozzle[1] ALEKSANDAR DZODIC, EMMA GIST, SETH KELLY, MARK GLAUSER, Syracuse University — The interactions in a supersonic flow involve a level of complexity that oftentimes does not match natural intuition that is built concerning the usual incompressible flows. Thus, experimentation is key to making improvements in aircraft design. Concerning supersonic aircrafts, one may analyze specifically the jet outlet and the compressible interaction of the flow which is emanated. By employing a supersonic jet with a single expansion ramp nozzle, this flow can be simulated. Then, by utilizing Particle Image Velocimetry (PIV), interactions can be further identified and characterized. From these PIV images, we can observe shockwaves that form from the jet outlet which continue downstream after reflections off shear layers. These shear layers develop as the result of mixing between the supersonic flow and the ambient surroundings. By adjusting the shape of a deck plate which is positioned at the exit of the jet, the profile of the resulting shock train can be altered to achieve advantages in acoustics. This study compares the shock trains which emanate from varying deck plate configurations to a nominal case. The deck plates of interest are; a twice nominal deck plate, an infinite in span deck plate, and a triangular trailing edge deck plate.

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