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Influence of Splitter Plate Geometry on a Multi-Stream Jet Nozzle[1] EMMA GIST, Syracuse University, CORY STACK, The Ohio State University, DOMINIC DIDOMINIC, TYLER VARTABEDIAN, SETH KELLY, Syracuse University, DATTA GAITONDE, The Ohio State University, MARK GLAUSER, Syracuse University — Current and future aircraft designs are focusing on the integration of propulsion systems into the airframe to maximize efficiency and provide a stealth profile. This integration has led to different nozzle configurations such as the Multi-Aperture Rectangular Single Expansion Ramp Nozzle (MARS) where the nozzle has a primary and secondary bypass. This examination focuses on the reintroduction of the secondary subsonic bypass with the supersonic core flow and their mergence behind a splitter plate. The two streams differ from each other in all aspects, including the velocity, pressure and density. Large-Eddy simulations (LES) have shown that splitter plate thickness affects the formation and evolution of large-scale structures in the presence of the shock and expansion wave system. This also impacts the acoustics as well as the mechanical loading due to the unsteady fluctuations in the flow. This study focuses on using thinner splitter plates and the introduction of passive control by a geometric change on the end of the splitter plate where the streams coalesce. This study aims to provide insight into the physics associated with the complex merging flows and how a splitter plate can be used to manipulate the flow to reduce noise without compromising performance.

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Emma Gist
Syracuse University

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