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Supersonic Jet Noise Reduction Using Microjets EPHRAIM GUTMARK, DAN CUPPOLETTI, BHUPATINDRA MALLA, University of Cincinnati — Fluidic injection for jet noise reduction involves injecting secondary jets into a primary jet to alter the noise characteristics of the primary jet. A major challenge has been determining what mechanisms are responsible for noise reduction due to varying injector designs, injection parameters, and primary jets. The current study provides conclusive results on the effect of injector angle and momentum ux ratio on the acoustics and shock structure of a supersonic Md=1.56 jet. It is shown that the turbulent mixing noise scales primarily with the injector momentum flux ratio. Increasing the injector momentum flux ratio increases streamwise vorticity generation and reduces peak turbulence levels. It is found that the shock-related noise components are most affected by the interaction of the shocks from the injectors with the primary shock structure of the jet. Increasing momentum flux ratio causes shock noise reduction until a limit where shock noise increases again. It is shown that the shock noise components and mixing noise components are reduced through fundamentally different mechanisms and maximum overall noise reduction is achieved by balancing the reduction of both components.

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