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Coupling dynamic of twin supersonic jets[1] CHING-WEN KUO, JORDAN CLUTS, MO SAMIMY, The Ohio State University — In a supersonic shock-containing jet, the interaction of large-scale structures in the jet's shear layer with the shock waves generates acoustic waves. The waves propagate upstream, excite the jet initial shear layer instability, establish a feedback loop at certain conditions, and generate screech noise. The screech normally contains different modes of various strengths. Similarly, twin-jet plumes contain screech tones. If the dynamics of the two jet plumes are synchronized, the screech amplitude could be significantly amplified. There is a proposed analytical model in the literature for screech synchronization in twin rectangular jets. This model shows that with no phase difference in acoustic waves arriving at neighboring nozzle lips, twin-jet plumes feature a strong coupling with a significant level of screech tones. In this work the maximum nozzle separation distance for sustained screech synchronization and strong coupling is analytically derived. This model is used with our round twin-jet experiments and the predicted coupling level agrees well with the experimental results. Near-field microphone measurements and schlieren visualization along with the analytical model are used to investigate the coupling mechanisms of twin supersonic jets.

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