

Abstract Submitted  
for the DFD13 Meeting of  
The American Physical Society

**Supersonic Jet Noise Reduction Using Flapping Injection and Pulsed Injection**<sup>1</sup> HAUKUR HAFSTEINSSON, PhD Student, LARS-ERIK ERIKSSON, Professor, DANIEL CUPPOLETTI, PhD Student, EPHRAIM GUTMARK, Professor, DEPARTMENT OF APPLIED MECHANICS, CHALMERS UNIVERSITY OF TECHNOLOGY TEAM, DEPARTMENT OF AEROSPACE ENGINEERING, UNIVERSITY OF CINCINNATI TEAM, SWEDISH DEFENCE MATERIAL ADMINISTRATION, SWEDEN TEAM — Aircraft are in general noisy and there is a high demand for reducing their noise levels. The jet exhaust is in most cases the main noise source of the aircraft, especially for low bypass ratio jet engines. Fluidic injection affecting the shear layer close to the nozzle exit is a promising noise reduction technique as it can be turned off when not needed and thus the negative effect on the engine performance will be minimized. In the presented work, LES is used to compare steady-state mass flow injection with steady-state mass flow flapping jet injection. The work is a direct continuation of a previous LES study on pulsed injection which showed that the pulsed injection induced pressure pulses in the jet which caused increased tonal noise in the downstream directions. The injection system considered in the presented work consists of eight evenly distributed injectors at the nozzle exit plane with a  $90^\circ$  injection angle relative to the flow direction. Flapping jet injection is believed to minimize the creation of these pressure pulses since it provides steady-state mass flow.

<sup>1</sup>This work is funded by Swedish Defense Material Administration (FMV)

Haukur Hafsteinsson  
PhD Student

Date submitted: 05 Jul 2013

Electronic form version 1.4