JOHNS HOPKINS
Center for Environmental
& Applied Fluid Mechanics

Weekly CEAFM Seminar: Fall 2013

Date: **Friday, November 8, 2013**

Time: 11:00 AM

Location: Gilman # 50 (Marjorie M. Fisher Hall)

Speaker: **Professor Luc Mongeau** (McGill University)

Title: ***"Applications of the Lattice Boltzmann Method for the Simulation of Flow and Sound from Lobed Mixers Jets"***

Abstract

The growing stringency of community noise regulations for commercial turbo-fan engine requires the development of effective jet noise suppression configurations. Small engines for regional jets have relatively low bypass ratios because of size limitations. The large number of geometrical design parameters for lobed mixers makes trial and error experimental studies prohibitively expensive. A robust computational tool was used to investigate the effects of the lobed mixer design on the sound radiated by the jet. The near field sound and flow were simulated using a flow solver based on the Lattice Boltzmann Method (LBM). The far field radiated sound was predicted using the Ffwocs William-Hawkings (FWH) surface integral method. One baseline confluent nozzle and several nozzles with varying scalloping and lobe penetration depths were investigated. Low Mach number flow was assumed, with operating conditions selected to best approach conditions for actual engines. The effects of an outer mean flow to simulate forward flight were not included. The results suggested that scalloping doesn't always bring benefit to noise reduction, and that there exists an optimal value for scalloping depth. Results were in qualitative agreement with available experimental results.