

The 4th Montreal Scientific Computing Days  
April 16–17, 2007

# Sonic boom minimization using remote inverse design

Olivier Soucy  
*Department of Mechanical Engineering*  
*McGill University*  
*817 Sherbrooke St. West*  
*Montréal, Québec H3A 2K6*  
*Canada*  
olivier.soucy@mail.mcgill.ca

## **Abstract**

This work presents a remote inverse adjoint algorithm for the reduction of the sonic boom of supersonic aircraft. The method controls the near field pressure signature to meet a desired ground plane signature. This reshaped near field signature then serves as a target for an adjoint optimization method quantifying the influence of geometry modifications on the pressure distribution at an arbitrary location. Solving for the solution involves discretization of the governing equations, evaluation of change in a cost function due to variation of the design variables and a redefinition of the gradient as a Sobolev inner product to accelerate the convergence.