CENTER FOR FLUID MECHANICS
AND
THE FLUIDS, THERMAL AND CHEMICAL PROCESSES GROUP
OF
THE DIVISION OF ENGINEERING
SEMINAR SERIES

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A Quiet Free Shear Flow

The talk will focus on our efforts using adjoint-based optimization to study the fluid mechanics of sound generation by free shear flows, with application to jet noise. An optimal control algorithm is shown to be able to reduce the noise from a model flow by over 10dB, which affords a unique opportunity to investigate the noise mechanisms that are suppressed by the control. Direct comparison of the noisy flow to its quieted counterpart shows that it is superficially unchanged.

However, projection onto the flow's empirical eigenfunctions (POD modes) indicates that the controlled flow has a more regular underlying wave-packet character. It is concluded that the control exploits the sensitivity of such wave-packet-like noise sources to their specific details in order to `find' small perturbations that make the flow acoustically inefficient.

November 14, 2006
Barus & Holley, Room 190
3:00pm