Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

LES-based characterization of a suction and oscillatory blowing fluidic actuator[1] JEONGLAE KIM, PARVIZ MOIN, Center for Turbulence Research, Stanford University — Recently, a novel fluidic actuator using steady suction and oscillatory blowing was developed for control of turbulent flows [1]. The suction and oscillatory blowing (SaOB) actuator combines steady suction and pulsed oscillatory blowing into a single device. The actuation is based upon a self-sustained mechanism of confined jets and does not require any moving parts. The control output is determined by a pressure source and the geometric details, and no additional input is needed. While its basic mechanisms have been investigated to some extent, detailed characteristics of internal turbulent flows are not well understood. In this study, internal flows of the SaOB actuator are simulated using large-eddy simulation (LES). Flow characteristics within the actuator are described in detail for a better understanding of the physical mechanisms and improving the actuator design. LES predicts the self-sustained oscillations of the turbulent jet. Switching frequency, maximum velocity at the actuator outlets, and wall pressure distribution are in good agreement with the experimental measurements. The computational results are used to develop simplified boundary conditions for numerical experiments of active flow control.
[1] Arwatz *et al.*, *AIAA J.* **46**(5) 2008.

[1]Supported by the Boeing company

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Date submitted: 30 Jul 2015 Electronic form version 1.4