

## CONTROLLING DYNAMIC STALL WITH AN ACTIVE FLEXIBLE WALL

Niranjan L Mangla  
Associate Professor  
Department of Mechanical Engineering  
YMCA University of Science and Technology  
Faridabad-121 006, Haryana, India  
Ex-Graduate Student  
Department of Mechanical Engineering  
University of Mississippi, U S A  
Email : niranjanmangla@ymcaust.ac.in

Sumon K Sinha  
President  
Sinhatech, 3607 Lyles Drive  
Oxford, MS 38655, U S A  
Ex-Associate Professor  
Department of Mechanical Engineering  
University of Mississippi, U S A  
Email : [sumon@sinhatech.com](mailto:sumon@sinhatech.com)

### Abstract

A low energy active flexible wall transducer has been used to interact with unsteady separating boundary layers over a pitching NACA 0012 airfoil, at a Mach Number of 0.1, Reynolds Number around  $6 \times 10^5$  and reduced frequencies around 0.1. The transducer consisted of an array of thin strip shaped high and low electrodes covered with an aluminized Mylar membrane. An electric excitation was given to two adjacent strips generating vibrations of the membrane of around 0.01 m amplitude over the actuated strips. The pressures were measured along the central chord axis using a pressure scanner. The electric excitation of the transducer at a frequency corresponding to Strouhal Number (based on strip spacing and local free stream velocity) of approximately 1 delayed the onset of dynamic stall by  $2^\circ$ . The maximum actuation power consumption was 1 W for 30 cm of actuated length in the span wise direction.