FM11S_11043

XXI International Congress of Theoretical and Applied Mechanics
Warsaw, Poland, August 15–21, 2004

Manipulating a Vee-Shaped Bluff Body Wake Using a Fluidic Oscillator

Rong F. Huang, Kuo T. Chang

Department of Mechanical Engineering, National Taiwan University of Science and Technology, Taipei, Taiwan

The vee-shaped bluff body was re-designed by employing the unsteady Coanda effect to induce self-sustained, periodically oscillating jet. The oscillating jet was expelled through narrow passages and injected into the near wake of the vee-shaped bluff body to modify the wake characteristics. Behaviors and frequency characteristics of the slit-jet in the oscillation cavity as well as the turbulence properties in the wake were studied experimentally in a wind-tunnel by using the smoke-wire flow visualization technique, hot-wire anemometer, and PIV. The oscillation frequencies of the presently developed jet-injection vee-gutter were about 25 to 40 times higher than that of the conventionally used fluidic flowmeter. The integral length scales of turbulences of the jet-injected vee-shaped bluff body were significantly smaller than their counter parts of the conventional bluff body, which indicated that large effect of vortex stretching was induced by the periodic jet injection. Modifications of turbulence properties were presented and discussed.

View the extended summary