

Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

Skin-friction reduction by multiple cavities¹ CHULKYU KIM, WOO-PYUNG JEON, HAECHEON CHOI, Seoul National University — A possibility of reducing the skin-friction drag in a turbulent boundary layer with a two-dimensional cavity (elongated in the spanwise direction) has been investigated in the literature. In our previous numerical study (Hahn et al. 1999), we have shown that a single cavity indeed reduces the skin friction by about 10% in a turbulent boundary layer. Now, the question is whether or not the skin friction is decreased by a series of cavities distributed all over the flat plate. In order to answer this question, we perform an experiment for flow over multiple cavities. The Reynolds numbers based on the free-stream velocity and momentum thickness (θ) are from 5300 to 9300. The drag is measured directly with a free floating balance. The cavity configurations considered are in the range of $d/\theta = 0.25 \sim 1$, $l/d = 1 \sim 4$ and $s/d = 5 \sim 20$, where d is the cavity depth, l is the cavity length and s is the streamwise spacing between two consecutive cavities. So far, the case of $d/\theta = 0.25$, $l/d = 1$ and $s/d = 11$ produces about 2% drag reduction among the cavity configurations investigated. Direct drag measurements are being performed for more cavity configurations, and the drag-reduction results and some boundary layer measurements will be given in the final presentation.

¹Supported by CRI, MOST

Haecheon Choi
Seoul National University

Date submitted: 05 Aug 2005

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