Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Shear-layer Effect on Wall Pressure Statistics in Turbulent Channel Flow MASAYUKI SANO, TATSUYA TSUNEYOSHI, Nagoya University, YOSHINOBU YAMAMOTO, University of Yamanashi, YOSHIYUKI TSUJI, Nagoya University — The coherent structures are studied near wall region in turbulent channel flow by means of Direct Numerical Simulation (DNS). We analyze the correlation between coherent structures and wall pressure with positive and negative high amplitude peaks. DNS Reynolds numbers based on the friction velocity and the channel half-width are from 150 to 2000. The probability density functions of pressure indicate that there are different coherent structures associated with positive and negative pressure region. In order to evaluate the influence of the coherent structures on wall pressure, we visualize the conditioned streamwise velocity and second invariant of the deformation tensor conditioned by wall pressure. The second invariant of the deformation tensor is called Q criterion, which represents the intensity of vortices. It is found that the high pressure region is related to shear-layer in the buffer region and the negative pressure region is generated by small-scale vortices. Previous studies reported only the low-Reynolds number case, but the same results are confirmed in relatively high Reynolds number. The shear layer at Re_τ =150 and 1000 have the same spanwise scales. The result shows that the spanwise meandering of the large scale structure is normalized by the inner scale.

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Date submitted: 29 Jul 2014 Electronic form version 1.4