

Abstract Submitted
for the DFD08 Meeting of
The American Physical Society

Further insight into physics of rough-wall turbulent boundary layer KIRAN BHAGANAGAR, University of Michigan, VEJAPONG JUTTIJUDATA, Kesetsart University, MEHMET SEN, University of Maine — To get a good understanding of the effect of surface-roughness in altering the flow in a turbulent boundary layer it is important to understand the alterations in the dynamical activity of the flow. For this purpose direct proper orthogonal decomposition (POD) has been used as a tool. The data used for the POD has been obtained from direct numerical simulation of flow in a channel with egg-carton roughness elements. In this talk the effects of surface-roughness on the temporal flow dynamics such as bursting frequency of the energetic structures in the flow will be discussed. VITA detection technique has been used to obtain the bursting frequency. It has confirmed that rough-wall has a shorter bursting period and a higher turbulence activity compared to the smooth-wall. The results have confirmed the existence of roll and propagating modes for flow over rough-wall. In addition to the turbulent kinetic energy, the concept of entropy that has been introduced in this study within the context of degree of distribution of energy over range of scales, is a useful metric to categorize the rough-wall flow dynamics.

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Date submitted: 12 Aug 2008

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