Abstract Submitted
for the DFD08 Meeting of
The American Physical Society

Experimental Investigation of Near-Wall Flow Structures in a Rough-Wall Turbulent Channel Flow[1] JIARONG HONG, Graduate Student, JOSEPH KATZ, Professor, MICHAEL SCHULTZ, Associate Professor — This study focuses on the near-wall flow structure in a turbulent channel flow with rough walls. To suppress strong reflections at the fluid-roughness interface that hamper typical optical measurements, we utilize a facility containing a fluid with the same refractive index as the rough acrylic wall, making the interface almost invisible. Presently, stereo (SPIV) is used to measure the flow field in the vicinity of uniformly distributed, closely-packed 0.45mm high pyramids with slope angle of 22°. The flow is fully developed in the sample area, and has a friction velocity Reynolds number of 12,400 and wall units of 5.7– 6.4 μm. Measurements are performed in several planes and magnifications. In y>3-5k, i.e. in the "external flow," the mean flow and Reynolds Stress profiles agree with results of contemporary studies. However, near the wall, at y<3k, there is a remarkable upsurge in the normal Reynolds stress components, but not in the shear stress. On going effort involves high magnification SPIV measurements in the near wall region.

[1]Sponsored by ONR

Jiarong Hong
Graduate Student

Date submitted: 06 Aug 2008 Electronic form version 1.4