Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

**Direct Numerical Simulation of a turbulent channel flow with 3D wedges randomly placed on a wall** STEFANO LEONARDI, LUIS MARTINEZ TOSSAS, EDGARDO GARCIA CARTAGENA, University of Puerto Rico at Mayaguez — Direct numerical simulations of a turbulent channel flow with 3D wedges of random height have been performed. In addition, two other simulations have been carried out to assess the effect of the geometry on the overlying flow. In the first simulation, the elements in the wake of higher wedges were removed while in the other, a uniform distribution of wedges with the same area was used. A wedge is considered in the wake of another element when the line joining the crests is steeper than 45 degrees. The bulk Reynolds numbers is 7000 which correspond in case of smooth walls to $Re_\tau = 300$. The comparison of the 3 surfaces has shown that near the wall, the uniformly distributed roughness represents only a poor approximation of the surface with wedges of random height. The surface obtained removing the wedges in the wake of previous wedges present Reynolds stresses, pressure distribution and spectra in good agreement with the original surface. Therefore, it is possible to reduce the geometrical complexity of a rough surface while retaining the same flow physics.

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Date submitted: 05 Aug 2011 Electronic form version 1.4