Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Evaluation of low Reynolds number turbulence models for open channel flow over a rough wall using high-resolution large eddy simulation (LES) data[1] SANDEEP BOMMINAYUNI, THORSTEN STOESSER, School of Civil and Environmental Engineering, Georgia Institute of Technology, Atlanta, GA, USA, NILS REIDAR OLSEN, Department of Hydraulic and Environmental Engineering, NTNU, Trondheim, Norway — Quite some effort has been put into the development of low Reynolds number turbulence models to enhance predictions of the near wall flow over smooth walls. Despite the success of these models analogous models for the flow over rough walls are sparse. Based on a high resolution large-eddy simulation of the flow over a bed artificially roughened by hemispheres, we test the applicability of several low Reynolds number models to rough wall flow. The Reynolds number of the flow based on the channel depth is Re=13,680 at a relatively low submergence of h/k=3.42, with h being the water depth and k the roughness height. Similar to flows over smooth walls, the near wall turbulent eddy viscosity requires some damping and damping functions developed for flows over smooth and rough walls are tested and evaluated. Moreover, in the log-layer i.e. at some distance away from the rough wall, the turbulent eddy viscosity is found to be smaller than over the smooth wall, suggesting damping over the entire water depth.

[1]Support for this study is received from NSF award 0738690.

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Date submitted: 08 Aug 2011 Electronic form version 1.4