Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

DNS of Flow Over Smooth and Rough Wavy Walls at $Re_\lambda = 4760$ VEDANT PURI, RAMESH BALAKRISHNAN, Argonne National Laboratory — Direct Numerical Simulations of turbulent flows over smooth and rough wavy walls has been conducted. The *Smooth Wavy Wall* is described by a sinusoidal wave in the streamwise direction with amplitude to wavelength ratio $a/\lambda = 0.05$. Small-amplitude sinusoidal roughness elements are superimposed on to the *Smooth Wavy Wall* to obtain the *Rough Wavy Wall*. The smaller undulations on the *Rough Wavy Wall* represent undulations that a Large Eddy Simulation may not be able to resolve, but whose effects should be reflected on the resolved flow field. The flows are characterised by Reynolds number of 2390 based on bulk velocity and channel half-height. The budget terms of the Reynolds Stress Transport Equations reveal strong coupling between wall-topography and turbulence dynamics near the wall. Flow separation at the crest of the *Smooth Wavy Wall* and the formation of a persistent recirculation zone near the trough are observed along with a shear layer spanning multiple wavelengths.

Vedant Puri
Argonne National Laboratory

Date submitted: 10 Aug 2020 Electronic form version 1.4