Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Roughness effects on fully developed pipe flow at high Reynolds numbers[1] MARCUS HULTMARK, MARGIT VALLIKIVI, ALEXANDER SMITS — Well resolved turbulence measurments were conducted in the Princeton/ONR Superpipe throughout the smooth and transitional regime and into the fully rough regime. The pipe tested was a commercial steel pipe with $k_{rms} = 5\mu$m. This pipe is smooth up to about $Re_D = 800 \times 10^3$, and fully rough above about $Re_D = 5 \times 10^6$. In order to resolve the turbulence at these high Reynolds numbers a nano-scale thermal anemometry probe (NSTAP) was used to obtain the data. This sensor has a sensing volume of $60 \times 2 \times 0.1\mu$m which is one order of magnitude smaller than conventional techniques, allowing to study the effects of rougness independently of any spatial filtering effects at high Reynolds numbers. This new data reveals information about the behaviour of roughness both in the inner layer and the outer layer.

[1]Supported under ONR Grant N00014-09-1-0263, monitored by Ron Joslin.

Marcus Hultmark
Princeton University

Date submitted: 03 Aug 2010 Electronic form version 1.4