

Abstract Submitted  
for the DFD15 Meeting of  
The American Physical Society

**Turbulent shear-flow over fractal arrays of surface-mounted cubes**

DANIEL J. WISE, WERNHER BREVIS, Univ of Sheffield, SHEFFIELD FLUID MECHANICS GROUP TEAM — The turbulent shear-flow over a bottom-wall fully covered by periodic multi-scale arrangements of obstacles is examined via Particle Image Velocimetry (PIV), Volumetric 3D Velocimetry (V3V) and Acoustic Doppler Velocimetry (ADV) measurements. Three obstacle patterns are utilised, all based on different numbers of iterations of the Sierpinski carpet fractal. In each case 2D/3D velocity fields of the flow formed within the porous channels, namely the flow beneath the mean obstacle height, are presented and analysed with respect to standard statistics such as the mean, rms velocity profiles, and the Reynolds stresses. Point-wise measurements within the obstacle arrays reveal that the presence of the obstacles, and in particular their injection of energy at the associated wavelengths, has unexpected effects on the slope of the energy spectra within the turbulent porous flow. The region dominated by these spectral characteristics is defined. It is also shown that this behaviour is not observed in the outer flow.

Daniel J. Wise  
Univ of Sheffield

Date submitted: 31 Jul 2015

Electronic form version 1.4