

Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Turbulent flows interacting with groups of obstacles SONIA TADDEI, COSTANTINO MANES, BHARATHRAM GANAPATHISUBRAMANI, University of Southampton — The interaction between a turbulent incoming flow and patches of obstacles (with circular cross section in plan view with diameter D) that contain a number of individual cylinders (N_c is the number of cylinders and d is their diameter) with different void-fractions ($\phi = N_c d^2 / D^2$) are studied. Streamwise-spanwise plane PIV measurements, at the mid-height of the patches, of the wakes generated by the different void-fractions show that the three-dimensionality of the patches and the incoming turbulence lead to different results compared to the laminar 2D cases available in literature. In particular, for void-fraction $\phi > 0.1$, no steady recirculation region is detected behind the obstacles, and even for lower ϕ , its streamwise length is drastically reduced. Furthermore, for higher ϕ (> 0.15), the wakes are not comparable with the one of a solid cylinder with the same height and diameter, as it happens for the laminar 2D cases. Results from vertical PIV measurements along the symmetry plane of the patches will also be discussed.

Bharathram Ganapathisubramani
University of Southampton

Date submitted: 28 Jul 2014

Electronic form version 1.4