

Abstract Submitted  
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**Simultaneous large-scale and sub-grid scale PIV measurements in a turbulent shear flow** OLIVER BUXTON, Imperial College London, BHARATHRAM GANAPATHISUBRAMANI, University of Southampton — An experimental investigation is undertaken in which the self-similar region of a nominally two-dimensional planar mixing layer is observed at inertial range and dissipative range spatial resolutions simultaneously. This is achieved by performing PIV experiments in which the field of view of three cameras, with a high spatial resolution, overlaps that of another camera with a lower spatial resolution in the far field of a mixing layer in which the Reynolds number based on the Taylor micro-scale is 260. The low-resolution experiment is thus analogous to a large eddy simulation (LES), in which the finest (sub-grid scale) stresses are modelled. This data thus permits an investigation of the effect of the large-scale fluctuations on the sub-grid scale (SGS) stresses, and vice-versa. It is found that the sign of the large-scale fluctuations is significant in determining the sub-grid scale activity, with low momentum (negative) large-scale fluctuations leading to an increase in the sub-grid scale stresses, particularly the  $u'v'$  component. A Smagorinsky type SGS model is also compared to the experimental data in order to determine the effects of the large-scale fluctuations on the eddy viscosity.

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