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Quantification of statistical phenomena in turbulent dispersions[1]
MATTHEW YATES, DAVID HANN, BUDDHIKA HEWAKANDAMBY, University of Nottingham — Understanding of turbulent dispersions is of great importance for environmental and industrial applications. This includes developing a greater understanding of particle movement in atmospheric flows, and providing data that can be used to validate CFD models aimed at producing more accurate simulations of dispersed turbulent flows, aiding design of many industrial components. Statistical phenomena in turbulent dispersions were investigated using Particle Image Velocimetry. Experiments were carried out in a two dimensional channel over a Reynolds number range of 10000-30000, using water and 500 micron hydrogel particles. Particles were injected at the channel entrance, and dispersion properties were characterised at different distances downstream from the injection point. Probability density functions were compiled for the velocity components of the hydrogels for differing flow conditions. Higher order PDFs were constructed to investigate the behaviour of particle pairs. Dispersed phase data was also used to investigate the mechanics of collisions between hydrogel particles, allowing for calculation of the co-efficient of restitution. PIV algorithms were used to create velocity maps for the continuous phase for varying dispersed phase fractions.

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Matthew Yates
University of Nottingham

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