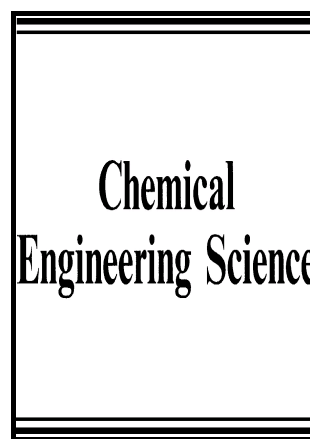


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Experimental investigation on modulation of homogeneous and isotropic turbulence in the presence of single particle using time-resolved PIV

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Abstract

Turbulence modulation of a nearly isotropic flow field due to the presence of single glass particles, with diameters in the range of 1–8 mm ($\sim 10 - 77$ times the Kolmogorov scale), was studied experimentally in an oscillating grid apparatus. Particle image velocimetry (PIV) was used to obtain the instantaneous, two-dimensional velocity field for grid Reynolds number, Re_g , varying from 1080 to 10,800. Fluctuating velocity components, flow field length scales, energy dissipation rates, turbulence intensity modulation and energy spectra were determined. An apparent increase of $\sim 2 - 25\%$ in the turbulence fluctuating velocity in the inertial subrange was noted compared with the fluid-only system. Presence of the particle

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