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Experimental Estimation of Turbulence Modification by Inertial Particles at Moderate Re_λ MARTIN OBLIGADO, LEGI, DANIEL ODENS MORA, LEGI / University of Washington, ALAIN CARTELLIER, LEGI — Several experimental and numerical studies have aimed at quantifying the impact of inertial particles on turbulent kinetic energy, and turbulent kinetic energy dissipation (ε) of particle-laden flows. We propose a new experimental method to estimate the carrier-flow dissipation ε_p in the presence of inertial sub-kolmogorov particles at moderate Re_λ (Mora et al. PRF, 2019). Its foundations rely on the unladen flow dissipation calculation using the Rice theorem, and the density of zero crossings n_s of the longitudinal velocity fluctuation coming from a laser doppler anemometry device. We show that, under some mild assumptions, that ε_p can be deduced from the value of n_s. Our experimental results provide strong evidence, regarding the non-negligible effect that dense sub-kolmogorov particles have on the carrier flow energy cascade at $\phi_v = \mathcal{O}(\infty\prime^{-\triangledown})$, and $Re_\lambda \in [200 - 600]$. Our observations are consistent with previous two-way coupling DNS studies at similar concentrations. Our results may also have an impact on distinct phenomena on particle-laden flows that depend on the coupling of the particles with the flow, such as preferential concentration and settling velocity modifications.

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