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Preferential Concentration of Inertial Sub-Kolmogorov Particles.The roles of mass loading of particles, St and Re_λ numbers SHOLPAN SUMBEKOVA, Univ Grenoble Alpes, LEGI, F-38000 Grenoble, France, ALBERTO ALISEDA, Department of Mechanical Engineering, University of Washington, Seattle WA 98195- 2600, USA, ALAIN CARTELLIER, CNRS, LEGI, F-38000 Grenoble, France, MICKAEL BOURGOIN, Univ Lyon, Ens de Lyon, Univ Claude Bernard, CNRS, Laboratoire de Physique, F-69342 Lyon, France — Turbulent flows laden with inertial particles present multiple open questions and are a subject of great interest in current research. Due to their higher density compared to the carrier fluid, inertial particles tend to form high concentration regions, i.e. clusters, and low concentration regions, i.e. voids, due to the interaction with the turbulence. In this work, we present an experimental investigation of the clustering phenomenon of heavy sub-Kolmogorov particles in homogeneous isotropic turbulent flows. Three control parameters have been varied over significant ranges: $Re_\lambda \in [170 - 450]$, $St \in [0.1 - 5]$ and volume fraction $\phi_v \in [2 \times 10^{-6} - 2 \times 10^{-5}]$. The scaling of clustering characteristics, such as the distribution of Voronoï areas and the dimensions of cluster and void regions, with the three parameters are discussed. In particular, for the polydispersed size distributions considered here, clustering is found to be enhanced strongly (quasi-linearly) by Re_λ and noticeably (with a square-root dependency) with ϕ_v, while characteristic cluster and void lengths are driven primarily by Re_λ. Weak dependence on St supports "sweep-stick" mechanism of clustering.

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