

Abstract Submitted
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Reynolds number dependence of heavy particle preferential concentration¹ XIANGJUN WANG, MINPING WAN, Southern University of Science and Technology — The preferential concentration of particles is a classical problem in particle-laden turbulence. The dependence of particle clustering on Reynolds number is still an open question. Here, the Reynolds number dependence of heavy inertial particles in homogeneous isotropic turbulence has been investigated. According to the analysis of Voronoi tessellation, the preferential concentration of small heavy particles is studied with the increase of Taylor Reynolds number from 52 to 139, with the number density of particles fixed. There are two factors that determine the extent of particle clustering. The first one is the strength of vortices in turbulence; the other is the persistent time that characteristic vortices drive particles to preferentially accumulate during one turnover time. Obviously, a larger strength of vortices and a longer persistent time contribute to a more intensive preferential concentration of particles. It is uncovered that the strength of vortices increases as Reynolds number increases, whereas the persistent time decreases with Reynolds number. Consequently, the influence of the latter defeats that of the former in present investigation. Therefore, the degree of preferential concentration decreases with Reynolds number.

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