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Intermittent Distribution of Heavy Inertial Particles in Turbulent Flows

Alain Pumir(1), Gregory Falkovich(2)

(1) *INLN, Valbonne, France*
(2) *The Weizmann Institute of Sciences, Rehovot, Israel*

The phenomenon of preferential concentration of inertial particles is studied by following lagrangian trajectories. Elementary properties of the coarse-grained distribution of heavy particles in simple turbulent flows are investigated by direct numerical simulations. In the small Stokes number case, we compute the coarse-grained particle distribution, $\bar{n}_r$, and we demonstrate that the second moment $\langle \bar{n}_r^2 \rangle$ behaves as an approximate power law: $\langle \bar{n}_r^2 \rangle \sim r^{\alpha}$. The dependence of the exponent α as a function of the Reynolds and of the Stokes number is studied in the small Stokes number limit. Our results show a strong dependence of the level of fluctuation of the particle distribution as a function of the Reynolds number.

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