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Statistics of the relative velocity of particles in bidisperse turbulent suspensions[1] AKSHAY BHATNAGAR, Nordita, KTH Royal Institute of Technology and Stockholm University, Roslagstullsbacken 23, 10691 Stockholm, Sweden, KRISTIAN GUSTAVSSON, Department of Physics, University of Gothenburg, 41296 Gothenburg, Sweden, BERNHARD MEHLIG, Department of Physics University of Gothenburg 41296 Gothenburg, Sweden, DHRUBADITYA MITRA, Nordita, KTH Royal Institute of Technology and Stockholm University, Roslagstullsbacken 23, 10691 Stockholm, Sweden — We calculate the joint probability distribution function (JPDF) of relative distances (R) and velocities ($\mathbf{V}$ with longitudinal component V_R) of a pair of *bidisperse* heavy inertial particles in homogeneous and isotropic turbulent flows using direct numerical simulations (DNS). A recent paper (J. Meibohm, *et. al.* 2017), using statistical-model simulations and mathematical analysis of an one-dimensional white-noise model, has shown that the JPDF, $\mathcal{P}(\mathcal{R}, \mathcal{V}_\mathcal{R})$, for two particles with Stokes numbers, St_1 and St_2, can be interpreted in terms of St_M, the harmonic mean of St_1 and St_2 and $\theta \equiv \mid St_1 - St_2 \mid /(St_1 + St_2)$. For small θ there emerges a small-scale cutoff R_c and a small-velocity cutoff V_c such that for $V_R \ll V_c$ and $R \ll R_c$ the JPDF, $\mathcal{P}(\mathcal{R}, \mathcal{V}_\mathcal{R})$, is independent of R and V_R. Beyond these two small-scale cutoffs the JPDF for the bidisperse case shows the same scaling behavior as the JPDF for *mono-disperse* particles with $St = St_M$. Our DNS demonstrate that this is true and the scales R_c and V_c are proportional to θ for small θ.

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