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A Universal Scale for Cluster Size Distribution of solid spheres and red blood cells Suspended in Pressure-Driven Flow CYRUS AIDUN, E-JIANG DING, Georgia Institute of Technology — The focus of the present work is on clustering of neutrally buoyant solid particles suspended in viscous liquid under purely hydrodynamic interactions in the absence of Brownian motion. The approach is based on direct numerical simulation of the particle motion and interaction, considering the full hydrodynamic forces on the particle and particle-particle interaction. Rigid particles in the shape of sphere and red blood cell are considered. A transition in flow regime occurs at a critical concentration, which is characterized by a fundamental change in cluster size distribution. The post-critical state is characterized by a large cluster dominating the flow. We have found a 'universal' scaling relation for the cluster size distribution in the subcritical regime[1] in all the cases considered here. The underlying physics will be presented.

[1]E.-J. Ding and C. K. Cyrus, "Cluster size distribution and scaling for spherical particles and red blood cells in pressure-driven flows at small Reynolds number" Phys. Rev. Lett. 96 (2006) 204502.

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