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Columnar structure formation of a dilute suspension of settling spherical particles in a quiescent fluid[1] SANDER G. HUISMAN, THOMAS BAROIS, MICKAEL BOURGOIN, Univ Lyon, Ens de Lyon, Univ Claude Bernard, CNRS, Laboratoire de Physique, F-69342 Lyon, France, AGATHE CHOUIPPE, TODOR DOYCHEV, Institute for Hydromechanics, Karlsruhe Institute of Technology, 76131 Karlsruhe, Germany, PETER HUCK, CARLA BELLO MORALES, Univ Lyon, Ens de Lyon, Univ Claude Bernard, CNRS, Laboratoire de Physique, F-69342 Lyon, France, MARKUS UHLMANN, Institute for Hydromechanics, Karlsruhe Institute of Technology, 76131 Karlsruhe, Germany, ROMAIN VOLK, Univ Lyon, Ens de Lyon, Univ Claude Bernard, CNRS, Laboratoire de Physique, F-69342 Lyon, France — The settling of heavy spherical particles in a column of quiescent fluid is investigated. The performed experiments cover a range of Galileo numbers ($110 \leq Ga \leq 310$) for a fixed density ratio of $\Gamma = \rho_p/\rho_f = 2.5$. In this regime the wake undergoes several transitions for increasing Ga resulting in particle motions that are successively: vertical, oblique, oblique oscillating, and finally chaotic. In this work volume fractions up to $\Phi_V = \mathcal{O}\ (10^{-3})$ are investigated. Multi-camera recordings of settling particles are recorded and tracked over time in 3 dimensions. A variety of analysis including Voronoï analysis and pair angle analysis are performed and show a strong clustering behavior along with an enhancement settling velocity. The experimental findings are compared to simulations.

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Sander G. Huisman
Univ Lyon, Ens de Lyon, Univ Claude Bernard, CNRS, Laboratoire de Physique, F-69342 Lyon, France

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