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Formation of Bidisperse Particle Clouds JENN WEI ER, BING ZHAO, ADRIAN W.K. LAW, Nanyang Tech Univ, E. ERIC ADAMS, Massachusetts Institute of Technology — When a group of dense particles is released instantaneously into water, their motion has been conceptualized as a circulating particle thermal (Ruggerber 2000). However, Wen and Nacamuli (1996) observed the formation of particle clumps characterized by a narrow, fast moving core shedding particles into wakes. They observed the clump formation even for particles in the non-cohesive range as long as the source Rayleigh number was large (Ra>1E3) or equivalently the source cloud number (Nc) was small (Nc<3.2E2). This physical phenomenon has been investigated by Zhao et al. (2014) through physical experiments. They proposed the theoretical support for Nc dependence and categorized the formation processes into cloud formation, transitional regime and clump formation. Previous works focused mainly on the behavior of monodisperse particles. The present study further extends the experimental investigation to the formation process of bidisperse particles. Experiments are conducted in a glass tank with a water depth of 90 cm. Finite amounts of sediments with various weight proportions between coarser and finer particles are released from a cylindrical tube. The Nc being tested ranges from 6E-3 to 9.9E-2, which covers all the three formation regimes. The experimental results showed that the introduction of coarse particles promotes cloud formation and reduce the losses of finer particles into the wake. More quantitative descriptions of the effects of source conditions on the formation processes will be presented during the conference.

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