

Abstract Submitted
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Experimental study of lock-exchange gravity currents: Coupling between particle distributions and flow structures¹ ZHUANG SU, Peking Univ, MING PENG, Guangdong Yudean Group Co Ltd, HUIJING YUAN, CUN-BIAO LEE², Peking Univ — This work presents detailed experimental investigations of the interactions between the particles and flows of the lock-exchange particle-laden gravity currents. A phase Doppler particle analyzer provided non-intrusive and synchronous measurements of the velocities and grain sizes of the particles. High-speed particle image velocimetry was used to measure the flow fields. The measurements showed that the particle behavior and the currents were intricately coupled. Particle distributions at different parts of the current are given, showing that the particles' behaviors are highly related to the flow fields. The influences of the grain size to the flow fields are also investigated by comparing flow fields of currents carrying different particles to each other, as well as the un-laden currents. The presence of particles seems to postpone the evolving of the flow structures, it weakens the vorticity of the shear layer in the head but strengthens the vorticity in the body or tail of the currents. The influences to the flow fields increases with the grain size.

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