

Abstract Submitted
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Experimental study of lock-exchange gravity currents: Flow structures and instabilities¹ ZHUANG SU, Peking Univ, MING PENG, Guangdong Yudean Group Co Ltd, HUIJING YUAN, CUNBIAO LEE², Peking Univ — This work describes experimental investigations of lock-exchange gravity currents. High-speed particle image velocimetry and laser-induced fluorescence were used to study the spatial and temporal evolving of various flow structures and instabilities. Gravity currents develop a head-body-tail structure with different characteristics. The flow details inside the head are investigated. Kelvin-Helmholtz and gravitational instabilities are the two dominant instability modes here. These instabilities and their interactions strongly affect the head shape and the formation of the vertical structures in the currents. Two sets of inclined vertical structures are observed far behind the head. One set locates at the upper shear layer, tilting opposite to the flow direction. This set of structures evolves from the broken down K-H billows resulting from the interaction of the Kelvin-Helmholtz instability and gravitational instability in the current head. The other set locates at the bottom of the flow, tilting along the flow direction. This set is the result of the gravitational instability at the bottom.

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