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Energy evolution in the subaqueous granular column collapse process. YI AN, WENTAO ZHANG, Institute of Mechanics, Chinese Academy of Sciences, QINGQUAN LIU, Beijing Institute of Technology — We studied the energy evolution in the subaqueous granular column collapse process experimentally in this work to understand the unusual phenomena of long-runout reported by V. Topin et al. (PRL, 2012). We set up a well-controlled experimental facility with only one granular width to study the one layer subaqueous granular column collapse problem. We obtained the velocity field for both granular and liquid simultaneously by employing the refractive index matching and planar laser-induced fluorescence. We use Hough transform to identify and track the spherical granular and the 2D Particle Image Velocimetry to obtain the velocity field outside the granular body. We find the total kinetic energy E_k of the granular materials drop dramatically when granular particles turn horizontal with a sharp angle, which implies the granular collision is the key factor determining the runout. The viscosity of the ambient liquid may play multiple roles, on one hand, it reduces the total local collision events, on the other hand, it not only dissipates the kinematic energy but also extends the duration of the entire event. Thus a non-dimensional number describing the role of the viscosity is suggested.

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