

Collapse of an inclined wet granular layer induced by impact

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When a horizontal dry granular layer is inclined under the gravity, it remains stable as long as the inclination angle is less than the critical stable angle. When the angle exceeds the critical stable angle, its surface becomes unstable and grains begin to flow. This tendency can also be confirmed for wet granular matter. For dry granular matter, the critical stable angle is principally determined by frictional property of bulk granular matter. However, the critical stable angle for wet granular matter must be affected by the cohesive effect due to the water content. Therefore, the value of critical stable angle for wet granular matter is greater than that for dry granular matter, in general.

As the inclination angle approaches the critical one, the granular layer gradually loses its stability. If a small perturbation is applied to the granular layer, granular avalanche might be triggered in the vicinity of critical angle. Although this trend should be identical in both dry and wet granular matter, their detail behaviors could be different.

To investigate the granular avalanche flow triggered by perturbation, we performed simple experiments with dry and wet granular matter. First, the water content dependence of the critical stable angle was measured. As a result, we found that the critical stable angle approaches the asymptotic value by a small amount of water. This tendency is not surprising because it is well-known that the strength of wet granular matter also shows asymptotic value by a small amount of water (S.Herminghaus, *Wet granular matter*, World Scientific, 2013). Next, a solid projectile is impacted onto a granular layer which is tilted just under the critical stable angle. By the projectile impact, the granular avalanche could be triggered in some experimental conditions. During the impact, vibration of the bottom of granular container was measured using an accelerometer. From the peak amplitude and dominant frequency of the acceleration data, we are going to discuss the physical condition for the avalanche triggering. Details of analysis results will be provided in the presentation.

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