

Penetration Hardness in Wet Granular Media

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Wet granular materials are familiar systems that play an important role in various fields from geology, land slide and earthquake, to daily life, making sand castle. When liquid is added to a granular system, it turns to a cohesive and pasty media. Even the ancient Egyptians had realized the fact that it was easier to slide the sled of the gods over wet sand than dry one, because of the lower the friction, fewer people needed to carry the sled.

Formation of capillary bridge between grains in wet granular system makes a network of connections as a bridge between grains hence it becomes a yield and stiffer system. Capillary force connect adjacent particle due to the surface tension of the interstitial liquid.

We study the friction coefficient of wet granular matters by measuring the sliding friction of a sledge over wet granular media. Wet granular media can resist against normal load because of the capillary force between grains in comparison with the dry system. Furthermore we measure the penetration hardness of the same media, and find that the penetration hardness can serve as the right parameter which scales the friction coefficient. We show that the penetration hardness and friction coefficient behaves exactly opposite each other; therefore, there is a negative correlation between these two parameters.

Biography:

She is a PhD student in condensed matter physics at Alzahra University. Her thesis is concentrated on the friction of granular materials. In 2012, she won About 1600 US\$ from Iranian Nanotechnology Initiative for research in Nanotechnology; when she was a Master student studying on investigating the charge transport in G4-DNA nanowire.