Abstract Submitted
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Avalanche to Continuous flow transition in wet and cohesive granular media[1] ASHISH ORPE, SAPRATIV BASU, PANKAJ DOSHI, Chemical Engineering Division, National Chemical Laboratory — We have studied the flow of wet and cohesive granular media in a partially filled, horizontally rotating cylinder. Very small, amount of viscous liquid is added to dry granular particles and the mixture is rotated in the cylinder at various rotational speeds to determine the angle of repose in the avalanching regime, the continuous regime and at the transition rotational speed separating the two regimes. Every experimental run is carried out afresh at a pre-defined rotational speed using liquids with different free surface tension and added in different amounts. Increasing the liquid surface tension increases the angle of repose as well as shifts the transition rotational speed to increasingly higher values. Similar qualitative behaviour is also observed on increasing the amount liquid added. A linear dependence is observed when the transition angle of repose for all cases is plotted against the corresponding transition rotational speed. The entire flow regime is modeled using momentum and mass balance equations for the flowing layer of particles. The total stress in the flowing mass of particles is assumed to be a linear combination of frictional, collisional and capillary force contributions. The model equations are able to reproduce most of the observed flow behavior.

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