

Abstract Submitted  
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**Non-local rheology for dense granular flows in avalanches** ADRIEN IZZET, ERIC CLEMENT, BRUNO ANDREOTTI, ESPCI — A local constitutive relation was proposed to describe dense granular flows (GDR MiDi, EPJE 2004). It provides a rather good prediction of the flowing regime but does not foresee the existence of a creep regime as observed by Komatsu et al. (PRL 2001). In the context of a 2D shear cell, a relaxation length for the velocity profile was measured (Bouزيد et al., PRL 2013) which confirmed the existence of a flow below the standard Coulomb yield threshold. A correction for the local rheology was proposed. To test further this non-local constitutive relation, we built an inclined narrow channel within which we monitor the flow from the side. We managed to observe the creep regime over five orders of magnitude in velocity and fit the velocity profiles in the depth with an asymptotic solution of the non-local equation. However, the boundary condition at the free surface needs to be selected in order to calibrate the non-local rheology over the whole range of stresses in the system. In this perspective, we complement the experimental results with 2D simulations of hard and frictional discs on an inclined plane in which we introduce a surface friction force proportional to the effective pressure in the granular. We analyze these results in the light of the non-local rheology.

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