Acceleration of dense granular flows down a slope

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The continuum description of dense granular flows is still a challenge despite their importance in many geophysical and industrial applications. Here we focus on the acceleration stage for both dry and fluid-filled granular material flowing down a slope. Because the description of unsteady flows has been lacking in the literature, we first test whether the $\mu(I)$ rheology [1,2], shown to control steady flows, is also valid for accelerating flows. Using this rheology we analytically derive flow kinematics and compare the results to our computer simulations. Finally, we apply the model to predict runouts of dry or submarine landslides.

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