

Acceleration of dense granular flows down a slope

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ABSTRACT

The continuum description of dense granular flows is still a challenge despite their importance in many geophysical and industrial applications. Unlike previous works, which have explored steady flow properties, this study focuses on acceleration of granular material flowing down a slope. First we show that the $\mu(I)$ rheology [1,2], proved to control steady flows, is also valid for accelerating flows. We then incorporate the rheology into a continuum description, and derive the flow kinematics analytically. This analytical model predicts why, how and when granular materials reach steady flow, including a prediction of the transient velocity profiles and the transient time required to reach a steady flow. Finally, we apply the model to predict runouts of landslides.

REFERENCES

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