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## Associate editor comment

Eric Lajeunesse (Editor)

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Editor comment on "The Entire Landslide Velocity" by Shiva P. Pudasaini, Earth Surf.  
Dynam. Discuss., <https://doi.org/10.5194/esurf-2022-31-EC1>, 2022

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Dear Shiva Pudasaini,

I have now received two anonymous reviews of your manuscript «The Entire Landslide Velocity». Both reviewers appreciate the simplicity of your model with respect to the shallow water models, commonly used in the community. Yet both of them identify issues, which need to be addressed to make the manuscript accessible for the wider readership of ESurf. I would therefore advise you to revise your manuscript in line with the points raised by the reviewers. I would particularly insist on the following recommendations.

- Although the manuscript is presented as an effort to develop a model useful for practitioners, it focuses on the maths, sometimes to the detriment of Physics. There are many places where the manuscript — and the reader — would benefit from additional discussions about the relevance of the model, its potential applications, and the physical meaning of the parameters it involves.
- In the same vein, information about the assumptions that support the model and their range of validity are often implicit. The model has been presented in a previous publication, and the reader does not need a comprehensive mathematical derivation. Yet some basic information would help to make the manuscript accessible for a wider readership. What is the physics at work in the model? How are the lubrication, liquefaction and viscous forces parameterized? Does your model assume that the solid fraction is constant — and thus independent on the local velocity or other varying parameters? But what does the model predict or assume regarding the landslide's volume, thickness and shape? How do you set the values of the parameters alpha and beta? etc...
- Given that your model is a simplification of the well-established shallow-water model, I agree with the reviewers that a comparison of the outcomes of the two models is essential for the reader to assess the validity and the potential benefits of your approach. A comparison of the predictions of your model (velocity, runout distance, ...) to DEM simulations and/or experimental works in simple configurations would also help to convince the reader of what he might gain by adopting your approach.
- Like reviewer #1, I am concerned by the fact that your model seems independent of the landslide thickness. This point needs clarification. This is also one more reason to compare your model's predictions against the shallow-water equations and, if possible, against experimental data available in the literature. Good agreement between the two would indeed provide reassurance about the validity of your simplified model.
- Over the last 10 years, the physics community has done considerable work on the rheology of granular media. I believe that your manuscript would strongly benefit from

a discussion of your result in the light of recent results in the field of granular rheology. How, for example, does your lubrication, liquefaction and viscous forces connect to the well-established «  $\mu$  of  $I$  » rheological framework? See, for example, Jop et al. (2006) or Pouliquen, O., & Forterre, Y. (2009).

Kind regards,

Eric Lajeunesse

Jop, P., Forterre, Y., & Pouliquen, O. (2006). A constitutive law for dense granular flows. *Nature*, 441(7094), 727-730.

Pouliquen, O., & Forterre, Y. (2009). A non-local rheology for dense granular flows. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, 367(1909), 5091-5107.