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Comment on nhess-2021-289

Anonymous Referee #1

Referee comment on "Detrainment and braking of snow avalanches interacting with forests" by Louis Védérine et al., Nat. Hazards Earth Syst. Sci. Discuss.,
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The authors present an approach to quantify the effect of forest on a (slow) moving avalanche. To this end, they study the detrainment and braking due to trees by using a 3d model approach based on the material point method and a rheology previously proposed by one of the author.

They study varying forest stand composition and derive an empirical formula for practical use. The newly proposed formula is compared to one proposed by Feistl (2015).

The paper presents an important step to describe and quantify the interaction between avalanches and the efficiency of a forest to mitigate moving avalanches.

General comments:

The authors refer to the approach by Feistl (2015). At this point it would be valuable for the reader to get some more information about this approach without to have to look the full thesis.

To enhance the practical usefulness, it would be nice, if the parameter study would cover more typical parameter combinations of forest stands. Firstly a tree diameter of 1 m refers to a rather very mature forest. Secondly, the stand density index (Reinke, 1933) in their example (figure 9) covers a range from $SDI = [900, 3600]$, whereby the later sound rather high..Using a combination of 1 m diameter and 400 trees per hectare suggests an efficiency that a natural forest probably doesn't fulfill.

The SDI would, properly, serve also better as fixed value for the comparison in figure 8 than the forest density.

By the way, for practitioners it is properly more common to speak of number, N , of trees per hectare , instead of density.

Instead of using the ambiguous expression forest cover, it is the basal surface area per hectare that is meant here.

Otherwise, the paper is well written and is a valuable contribution to an important question in respect to avalanche hazards and its mitigation.