Natural Hazards
and Earth System
Sciences

Open Access

Discussions

NHESSD

**Interactive
comment**

Interactive comment on "Brief Communication: Dynamic magnification factors for tree blow-down by powder snow avalanche air blasts" *by* Perry Bartelt et al.

Anonymous Referee #2

Received and published: 28 November 2017

Dear editor,

The paper presents an elegant method to estimate the dynamic magnification factor for a tree blow-down by a powder avalanche. Considering this factor, is important when back-calculating the avalanche parameters that causes the tree failure. Ignoring this factor may increase the estimated velocities and densities of powder snow avalanches and therefore making error in assessing the destruction power of this natural hazard. By making some basic assumptions and solving the equations analytically the authors improve our quantitative analysis of powder avalanches. In general, the paper is well written and organized. My main comments are to add some references that support

the use of basic models and to explain a bit more some of the terms and ideas. I hope to see it published after the authors will address these minor comments. Hope this helps

Minor comments:

Page 1, lines 11-12: "The age of the destroyed trees can be additionally used to link the historical observations to avalanche return period." Is there any previous study you can cite here?

Page 1, line 22: "We assume two deformation modes: stem bending and root-plate overturning" As these two modes of failure are basic terms in this paper, I would describe in more details what is the different in the failure mechanism between the two. Can we say that failure by bending causes by stem breakage at the base of the tree? Is it the same style of failure in the case of root-plate overturning or it is just tearing of many small roots? What are the field observations that support each deformation mode?

Page 1, line 24: Regarding the dynamic magnification factor. "This value is used to magnify the non-impulsive loadings". This is the most important term in the paper and you define it before. However, is it possible to show shortly, but somewhat quantitatively, how this factor actually influences the probability for failure. In the paper we get the method how to calculate D but what is the next step? Can the authors suggest a short answer for it in the text?

Page 1, line 24: A typo: change "he" to "the".

Page 3, line 6: I think that factor 2 is missing in the equation. Should be: $\omega=2\pi f$

Page 3, line 8: Are you the first to use drag force on trees? If not please cite a previous study. It is a turbulent drag equation as the powder avalanche is a fluid turbulence and therefore the drag equation is the one in use. I would emphasize this point and add some basic citation.

Page 4, equations 6 & 7: Did you define ψ?

Page 4, lines 6-7: What is the equation that is solved to get equations 6 & 7? Please add a reference here!

Page 4, line 13: "The maximum potential strain energy in bending is". Please add a reference here.

Page 4, equation 11: Same for here, what is the definition for the kinetic energy (shouldn't it includes a velocity term?). Please add a reference.

Page 5, line 4: I would add a short explanation of the conceptual model as was explained for the bending case (just below equations 6 & 7).

Page 7, line 26: What is DBH? Please define it in text.