

Review for TCD

Modeling snow slab avalanches caused by weak layer failure – Part II: Coupled mixed-mode criterion for skier triggered anticracks (revised version)

by Rosendahl and Weissgraeber

I am in general pleased with the replies, but I think some of the replies could have been better reflected in the manuscript. I suggest the authors consider the following points:

- P1, L12: I repeat that “collapse” is a poor term and it is not consistently used in the manuscript. Collapse is a generic term for the breakdown of a structure and does not refer to a specific failure mode. I suggest using failure, e.g. here on page 1, line 12, and compression, e.g. when referring to mode II (compression) vs. mode I (shear). Collapse is an essential process in relation to weak layer failure under mixed-mode loading and explains crack propagation in low-angle terrain. Of course, it is up to the authors to decide on how to use the term. Adding a definition might help easing potential confusion.
- Table 1: I suggested adding references to the choice of material parameters in Table 1. I acknowledge that the authors followed this advice. However, some of the references are simply other numerical studies that used similar values. I would expect, e.g. for fracture toughness, that the authors actually refer to corresponding experimental work.
- P12, L6-9: In the reply to my previous question 4, the authors states that the initial crack is generally unstable, and that the differential energy release rate always exceeds the fracture toughness. On page 12, lines 6-9 the authors write that the size of the initial crack is different from the critical crack size. I still think some clarification here would improve the manuscript.
- P12, L11: Please provide a definition and value for b , which I guess is the out-of-plane (ski) width. Also, it would be helpful to provide a typical value of F so that the results on critical skier force (e.g. in Figure 5) can be put into context. Also, for clarification I suggest that at least once you refer to the surface, e.g., on page 12, line 11: ... for static skier loading the local force acting onto the snow surface $F = \dots$
- P12, L20: “... where the out load will ... “ please consider rewording to improve clarity.
- P20, L9-12: By the way, slab fractures were also addressed by Gaume et al. (2015) and Reuter and Schweizer (2018).

Davos, 3 November 2019

Jürg Schweizer.