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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Cascade effect of rock bridge failure in planar rock slides: explicit numerical modelling with a distinct element code" *by* Adeline Delonca et al.

Anonymous Referee #3

Received and published: 23 November 2020

Dear Authors I read your paper with great interest. Rock bridges are indeed a "hot topic," and your numerical approach should interest the scientific community. However, I have some comments and some questions that need to be addressed before publication. The other reviewers have already put some forwards, but I have some more.

1) Why is your contact number different from your region's number? What kept you from maintaining them equal? I understand that 100 is a "round number" but that some regions may have more than one contact affects clarity.

2) What random distribution was used to select the regions to transform in OC? Was the relative location of the different regions considered in the randomization? Why did

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you choose this specific randomization method? How was "10% of the rock joint is intentionally modified from RB to OC contacts"? Is it again through a randomization tool? Of what kind?

3) Is there any account of elastic rebound in your model immediately after a rupture?

4) I also have some issues with the statement in line 211-212 "such a point could be easily be instrumented in the real case of motion tracking" – I have doubts about that, at this scale, since you are modelling displacement of less than a hundredth of a millimeter, and this quantity is really difficult to monitor on field. Moreover, what do you mean by "Figure 7 shows that there is only one trend when considering displacements" (line 216)?

5) Finally, the limitations of 2D approaches to study rock bridges should be discussed. We know that in 2D rock bridges are scale dependent (Elmo, 2018). Do you believe that the reduction of the strength parameters you imposed was scaled accordingly with your geometry? How would a tri-dimensional geometry affect your simulations?

Specific comments

- The scheme in fig 1a is not clear and readable; please emend it maybe using colors

- Why is g horizontal in figure 2? Please show the mesh of your model.

- Fig 3 caption must be way more informative. The graphs on the left should be described, especially the Step 2 one where we see two evolutions (?) one in black and one in gray

- The caption of Fig 4 should include the fact that it refers to Scenario 1, as Scenario 2 in the caption of Fig.2

- In Fig. 5 and fig 6 maybe substitute "the block does not stabilize" with "collapse" or "non-convergence of the simulation"

- Fig. 8. Wouldn't it be better to plot the height (better than altitude) of OC using the un-

stable block's base as reference? So a length that spans between 0 and 6*cos(alpha)? In this way, it would be easier to compare the average height of the contacts with the block's median point. Why do you think in model 2 the average height of the OC that induce collapse is higher (7 m) than the median poinf of the block? And why they seem to coincide in model 1? This needs to be discussed. It would also be useful if you plot a histogram of the average heights. Finally, the unit of measures [m] should be indicated in the figure.

- Fig 9 (not 09) – Scenario 3, not model 3

- In general, for many figures, the unit of measurement should be indicated in [] brackets instead of "in kPa"

L 23 – in other words

L 33 – are rock bridges

L 100 – "This division has been undertaken using FISH"

L 245 – play

L 249 – Figure 8 (no "the")

Check reference format: Brideau, Delonca (journal name abbreviated), Spreafico

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