

Interactive comment on “A new-type flexible rock-shed under the impact of rock block: experimental investigation” by S. Shi et al.

Anonymous Referee #2

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The manuscript illustrates an innovative technical solution for the protection of roads (and other linear infrastructures) from rockfalls. This solution mixes the advantages (but also the limitations) of flexible barriers and structural rock-sheds to provide a relatively lightweight, but spatially continuous protection structures. I agree with Anonymous Referee #1 that it represents a good starting point towards the development of new structural countermeasure approaches.

The idea is interesting and the adopted testing procedure seems able to provide the complete set of information to evaluate setup performance. The presentation is generally concise and clear. Nonetheless, my review rises some points that would deserve attention:

C1409

1) The authors seem to have performed only one experimental test. This is a very initial step to investigate the behaviour of this new type of structural rockfall protection, but much is yet to come. For example, I guess that multiple structural failure modes or interactions would be possible depending on the type of impact (e.g. vertical vs. oblique, central vs. eccentric) and the impacted structural element (e.g. nets, vaults, cable). I suggest that the title is changed into “A new-type flexible block: INITIAL EXPERIMENTAL INSIGHTS” or so, and that the authors summarize in the Conclusions the limits of present investigation and a “to do” outlook;

2) Although fitting into the Aims and Scope of NHESS, the contribution is exclusively focused on structural engineering testing aspects of the proposed rockfall protection approach, and is completely disconnected from real rockfall process and hazard “settings”. Rockfalls occur in very different conditions including high and steep rockwalls, cliff-talus vegetated slopes, partially engineered slopes etc. Different rockfall settings involve different typical block sizes, parameter uncertainty, velocity ranges and so on. The proposed protection solution may be suitable in some settings, but completely useless in others (e.g. a 250 kJ capacity seems very low in rockfall settings with medium-sized boulders or under high cliffs where significant free-fall occurs). In this form, the paper seems more suitable for a structural engineering journal than for NHESS. Although I agree with the primary focus, I would suggest the authors to better explain the “rockfall environments” in which the proposed mitigation approach would be useful and cost-effective. The advantages and limitations (technical, economic, etc.) of the approach should be better outlined in the conclusions;

3) Again with reference to the low capacity of the structure (250 kJ): authors state (Page 4067, lines 1-2) that higher energy absorption capacity could be achieved where needed by setting up multiple layers of nets. Nevertheless, in the results they show that a 250 kJ impact is enough to damage the steel hanging structure. Could the authors address better this point? How much do they believe that the structure capacity could be increased?

C1410

4) As a consequence of Point 1, cited reference linking rockfall processes/hazard/risk to countermeasure needs and design are almost lacking. Cited rockfall literature is either "engineering-oriented" or quite old. I encourage the authors to tell some more about the links between rockfall processes and the related protection needs starting from recent literature (a huge one has grown during the last decade). This could be done in the introduction and recalled in the Conclusions (quite short paper, there is space), and would contribute to better communicate the applicability of the proposed protection approach.

5) Figures are generally good and informative, but their size and lettering is too small is fitted in the journal editing format. In some cases, it is nearly impossible to see important details. I suggest to pack them more figure insets, enlarge and increase lettering. Tables would be useless if figure details were clearly visible.

6) English terms and spelling could be generally improved.

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