Dear Referee,

Thank you for your comments concerning our manuscript entitled “Study on Mechanical Properties and Dissipation Capacity of Ring Net in Passive Rockfall Barriers” (Manuscript Number: nhess-2018-76). Those comments are all valuable and very helpful for revising and improving our paper, as well as the important guiding significance to our researches. We have studied comments carefully and have made correction. We hope these revisions will meet with approval. The main corrections in the paper and the responds to your comments are as follows:

- The article uses the expression "brake rings". Please, be aware that the role of the handles brake rings are the so-called energy absorbing elements. There are not only brake rings around to perform this task depending on the manufacturer of a rockfall protection system. Therefore, I would change from "brake rings" to" energy absorbing elements".

Response: Thank you for your good advice. We think it is appropriate to change from "brake rings" to" energy absorbing elements". We have revised it in the paper.

- You are considering 2-, 4- and 6-point bending of the net rings. However, corner and edge rings in the 4-fold-ring nets are connected to 3 points. Your mechanical numerical analyses should include this setup.

Response: Thank you for your good advice. The corner and edge rings in the 4-fold-ring nets are indeed connected to 3 points. This is the problem we need to continue researching next. However, this paper mainly studies the mechanical properties and dissipation capacity of the ring net. The proportion of the 3-point connecting ring is relatively small, which has little effect on the energy consumption of the whole net, so we think the mechanical numerical analyses can exclude this setup.

- There is much more research on ring nets around as stated so far in the references. E.g. the works of Nicot in the late nineties are left our completely (use scholar.google and search for "nicot rockfall" for suitable references).

Response: Thank you for your good advice. Nicot et al. (2012) undertaken to analyse the mechanical behaviour of rockfall restraining structures. A spatial description of the

net is proposed, and a constitutive modelling in finite strains is presented. The proposed modelling is based on both the experimental and analytical approaches. But the main feature of this modelling is that the local behaviour of the net can be described in the usual framework of elasto-plasticity. We have added their research to the paper.

- P2L32: There are much more net types around. Have a check on the products of Trumer, Jakob, Isofer, etc.!

Response: Thank you for your good advice. the widely-used metal flexible nets are usually presented in the following forms: ring nets, rhombic nets, chain-link wire nets and omega nets. We have supplemented it in the paper.

(c) chain-link wire net

(d) omega net

- P2L34: Please, add some references for destructed ring nets!

Response: Thank you for your good advice. We have added some references for destructed ring nets.

Liu, C.Q., Wei, X.D., Lu, Z., Wu, H.D., Yang, Y.L., Chen, L.Y.: Studies on passive flexible protection to resist landslides caused by the May 12, 2008, Wenchuan earthquake, Struct. Design Tall Spec. Build., 26(11), 2017. DOI: 10.1002/tal.1372.

Wendeler, C., Volkwein, A.: Laboratory tests for the optimization of mesh size for flexible debris-flow barriers, Nat. Hazards Earth Syst. Sci., 15(12):2597–2604, 2015.

Canelli, L.; Ferrero, A. M.; Migliazza, M.: Debris flow risk mitigation by the means of rigid and flexible barriers – experimental tests and impact analysis, Nat. Hazards Earth Syst. Sci., 12(5):1693–1699, 2012.

Gianfreda, F.; Mastronuzzi, G.; Sanso, P.: Impact of historical tsunamis on a sandy coastal barrier: an example from the northern Gargano coast,southern Italy, Nat. Hazards Earth Syst. Sci., 1 (4), 2001.

- P2L35: "ring net the" –> "ring net. The"

Response: Thank you for your good advice. We have revised it in the paper.

- P3L41: What does "foreign" mean? Your publication is meant to be read world wide. If you are interested to publish only for China then "foreign" might be ok.

Response: Thank you for your good advice. We have revised it in the paper. The modification is as follows: Currently, it is true that some researchers have made great achievements in the structure of passive rockfall barriers. Although there was barely no difference all their test studies, the research on mechanics is still inadequate.

- P3L43: "characterizing" –> "characterize"

Response: Thank you for your good advice. We have revised it in the paper.

- P3L49-51: This sentence does not fit in here. "Tecco" is no ring-net. Further it hasn't been described before.

Response: Thank you for your good advice. certainly, "Tecco" is no ring-net. We have deleted this reference and added the following references:

Escallon et al. (2013) presents quasi-static and impact explicit FE simulation results of wire-ring net tests using an approach which relies on the general contact algorithm available in the FE code Abaqus. This approach allows a better description of the physics involved in impact problems related to rock falls. The model accounts for many complex physical processes: high-speed impact, contact with sliding friction, damage initiation and evolution, and strain-rate dependent material behavior.

- P3L52: "33% so" –> "33%. So"

Response: Thank you for your good advice. We have deleted this reference.

- P3L62: Chain-link nets were not described before.

Response: Thank you for your good advice. We have described Chain-link nets in Fig.3.

- P6L106: If you directly add theta with cos(theta) you should describe in which unit theta has to be used.

Response: Thank you for your good advice. θ is the angle variable, according to deformation assumptions, geometric relations and force analysis in Fig.5, we can calculate equation 1.

- P6L109: Grassl (2002) reports a different equivalent section radius. Please discuss. (Grassl, H. G. (2002). Experimentelle und numerische Modellierung des dynamischen Trag- und Verformungsverhaltens von hochflexiblen Schutzsystemen gegen Steinschlag (Doctoral dissertation, Ph. D. Diss. Swiss Federal Inst. of Technology Zurich, Switzerland).

Response: Grassl hans gerhard (2002) conducts dimensional analysis of the ring-net barriers components in the application empirical design procedures, and full-scale tests were performed using Single and three-span net configurations, net deformations and cable forces over time were measured. In parallel to the experimental research, a simplified explicit finite element program was developed. This program was coupled with a structural reliability program and used to analyse the reliability of the protection Systems.

-P6: If you have a plastically deformed net ring (2-, 3- or 4 point tension) and you cut it at one place completely through the "ring" shape gets lost and the it snaps inwards. This shows that the deformed ring stores a lot of elastic energy. Please, quantify and discuss this part.

Response: Thank you for your good advice. However, the plastic ring is cut off, and the energy produced by rebound is not within the scope of our study, which is what we need to further study in the future.

- P6L124: add "point" between "four" and "tension"

Response: Thank you for your good advice. We have revised it in the paper.

- P8L139: Does the bending deformation energy dissipation depend on the bending radius?

Response: The bending deformation energy dissipation does not depend on the bending radius.it depends on the diametric tensile load P, the radius of the ring R, the angle variable θ, the radial displacement variation under tension load on diameters δ; M_p is the plastic limit bending moment of the ring.

- P8L147: Please compare with the analytical solution of Nicot (see above).

Response: Nicot's research is mainly focused on ASM nets, which is different from the one used in our research, so there is no comparability.

- P8L175: Please, compare with the results of Grassl (2002).

Response: According to the results of Grassl (2002), the energy consumption of a single ring under four-point tension is about 10kJ, which is quite different from the results we calculated. However, according to the results of wang (Wang, M.: Rockfall impact protection system, Ph. D. Diss, Chongqing, Logistical Engineering University, 2011.), the energy consumption is 0.89kJ. That's pretty close to our calculation, this is an interesting question and we need to study it further.

- P8L181: "presented" –> "realized" ?

Response: Yes. "presented" –> "realized".

- P11Table3: Please, explain the displacement measurements. Are they including the static sag? Are they separated from the static sag? How has the static sag been treated in simulation?

Response: The results of the experiment are based on the work of Grassl (2002). The influence of static sag is not considered in simulation, some experiment results in table

3 are quite different from the numerical simulation results, and the failure to consider static sag in simulation is one of the important reasons.

- P11Table3: What is the maximum energy capacity of this setup? Compare it with the results of Grassl(2002).

Response: The maximum energy capacity is the energy of falling stone, which is 24kJ and 45 kJ respectively.

-P12L204: This section has a fundamental mismatch. If a ring net is attached to a circumferential rope, the rings can slide along the rope. This significantly changes the load bearing capacity of a ring net. Please, compare, discuss, adjust....

Response: Thank you for your good advice. In practice, the ring net is attached to a circumferential rope, the rings can slide along the rope, but in this paper, we simplify the boundary condition and simplify them into three forms: four-sided fixation, two-sided fixation and four-corners fixation. The boundary condition of sliding connection is a subject that needs further study.

-P12Fig.11: Please, arrange the drawn rings as they are arranged in simulation.

Response: Thank you for your good advice. We have arranged it in the paper.

- P13L231: Do you have comparable results from experiments?

Response: This is the result of our numerical simulation, and it is too late to do the experiment comparison, but it can provide a certain reference for the boundary conditions of the ring nets.

- P14L244/245: Add "alpha" somewhere

Response: Thank you for your good advice. We have revised it in the paper.

-P14Fig14&Fig17: Please, be aware that manufacturer uses the ring net for typical barrier panels with rings in the four courners! This changes the load bearing capacity.

Further, numbering of rows in Fig. 17 is not congruent with manufacturers numbering!

Response: Thank you for your good advice. In the course of our study, the ring network was simplified, and in order to make the research universal, the research did not follow the manufacturer's typical ring network type.

- P15Fig.15: Change "a" to "alpha".

Response: Thank you for your good advice. We have revised it in the paper.

- P15Fig.16: The right figure gives the impression of a vertical barrier with no "g" acting on the net. Please, choose a different viewing angle.

Response: Thank you for your good advice. We have revised it in the paper.

- P15Table5: The desctruction method is repeated identically four times. Please, adjust table to avoid this repitition.

Response: Thank you for your good advice. We have summarized the ways of destruction in the paper, combining four times into one.

- P16L260: "vertically" –> "orthogonally"?

Response: Yes, vertically" –> "orthogonally.

- P19Table6: "maximum" –> "impact"

Response: Yes, The maximum speed of rockfall –> The maximum impact speed of rockfall.

- P20L334: Please, sort the references alphabetically or use numbering if you want to keep the current order.

Response: Thank you for your good advice. We have rearranged the references alphabetically.

- P20L347: ".,:" –> ".:"

Response: Thank you for your good advice. We have revised it in the paper.

- P21L361: "DANY" –> "DYNA"

Response: Thank you for your good advice. We have revised it in the paper.