Comments response on "Simulation analysis of 3D stability of a landslide with a locking segment: A case study of the Tizicao landslide in Maoxian County, Southwest China"

Report #1   Submitted on 20 Jul 2023

Anonymous referee #2

Globally, the authors have responded to the questions raised and with the additions, it becomes clearer to understand the work done. However, some concerns still remain regarding the structure and the English language usage. Additionally, the overall organization of the paper may need to be reviewed.

1.Introduction: The motivation and importance of the study could be better focused and made more apparent.

Response 1: Thank you for your valuable and thoughtful comments. In the "Introduction" section, we first described the potential catastrophic effects of the landslide with a locking segment and the critical role of 3D stability analysis in assessing and predicting the overall stability of the landslide with a locking segment. Then, we reviewed literature about 3D stability methods and pointed out the disadvantages of these methods in the analysis of landslides with rock bridges. Furthermore, the parameters of rock bridges, such as length, penetration rate, strength parameters, joint strength parameters, relative positions (direction, coplane, or non-coplane), and shape of rock bridges, were determined since they should be considered in the 3D stability for the landslide with a locking segment. Lastly, three objectives of this work are proposed as follows:

(1) The first objective is to present an improved rock bridge model and to simulate the 3D stability and deformation behaviors of the Tizicao landslide using the model.

(2) The second objective is to explore the advantages and disadvantages of the three rock bridge models in the simulation of the 3D stability of landslides with a locking segment.

(3) The last objective is to explore the laws of the 3D Fos varying with the locking ratios and strength parameters of the locking masses and the sliding surface.

2.Methodology: The methodology section appears to be somewhat confusing. It would be better to organize all the methods used in a more orderly manner.

Response 2: We are sorry for the confusion of the methodology section. We added one paragraph to describe the process and operation of the methodology as follows:

The 3D stability of the Tizicao landslide was simulated using the FLAC3D program. First, we introduced three rock bridge models, namely IRMM, JM, and CSM-HSP, into the FLAC-3D program and determined the simulation elements and their characteristic parameters. According to the site survey of the Tizicao landslide, a 3D mesh model composed of a sliding bed, a sliding body, and a sliding surface was established. Then, we simulated the 3D stability of the Tizicao landslide using the three rock bridge models. Lastly, to compare the differences between the 2D and 3D stability of the Tizicao landslide, this study analyzed the 2D stability of four sections of the landslide using the SLOPE/W module of the GeoStudio 2012 program.

Please see the revised manuscript in detail. Thanks.

3. Results and discussion: This section should be the most interesting and crucial part of the paper, but it seems underdeveloped. A critical discussion of the results, their implications, limitations, and uncertainties is lacking.

Response 3: Thanks for your valuable and thoughtful comments. In the "Results and discussion" section, we further discussed the effects of the locking ratio on 3D stability. We added descriptions of the influence of the positions of locking masses on the 3D stability of landslides with rock bridges. Additionally, we pointed out that this study did not explore the effects of the curvature of the sliding surface on 3D stability, which will be discussed in future research. Besides, we added the statistics of rock bridge content obtained by previous researchers to explain the dramatic failure in the case of very low rock bridge content. Please see the revised manuscript in detail. Thank you.

4. Novelty/Originality: The novelty of the study does not appear to be adequately demonstrated.

Response 4: The novelty of this study is as follows:

(1) Three rock bridge models, i.e., IRMM, JM, and CSM-HSP, are established to simulate the 3D stability and deformation behaviors of the landslide with a locking segment.

(2) The advantages and disadvantages of the three rock bridge models are provided to

guide the 3D stability of the landslide with a locking segment.

(3) This study presents the laws of the 3D Fos varying with the locking ratios and strength parameters of the locking masses and the sliding surface.

In addition, we have asked a professional proofreading company to improve the English language usage of the modifications, which were carefully checked and polished by a native English speaker.

Report #2   Submitted on 03 Aug 2023

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There is no further suggestions for revision.