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Numerical analysis of earthquake response of an ultra-high earth-rockfill dam

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In the full review and interactive discussion, the referee accounted for the aspects indicated in the review process, answering point by point to the provided guidelines:

1. **Does the paper address relevant scientific and/or technical questions within the scope of NHESS?**

   The paper does not contain any relevant scientific contribute to the specific field of earth dams under seismic loading conditions.

2. **Does the paper present new data and/or novel concepts, ideas, tools, methods or results?**

   No novel data, concepts, ideas, tools, methods and results are presented.

3. **Are these up to international standards?**

   The presented results fairly reach an international standard

4. **Are the scientific methods and assumptions valid and outlined clearly?**

   The scientific method is outlined clearly. However, some doubts arise on the adopted constitutive model and parameter calibration for the scope of the paper, i.e. dynamic analysis of earth dams

5. **Are the results sufficient to support the interpretations and the conclusions?**

   The results are sufficient to show that the numerical tool works properly, but no validation of the obtained results is provided (neither in the static or dynamic field).

6. **Does the author reach substantial conclusions?**

   No substantial conclusions are reached. The conclusion simply describes the obtained numerical results, as a routine numerical computation.

7. **Is the description of the data used, the methods used, the experiments and calculations made, and the results obtained sufficiently complete and accurate to allow their reproduction by fellow scientists (traceability of results)?**

   This is the weakest point of the paper. The adopted constitutive model is not suitable to model soil response under cyclic loading conditions. Furthermore, the adopted constitutive model does not account for any change in mean effective stress since the yield function does not have any cap (as the models derived from the Cam Clay constitutive law). The authors claim the importance of solid-fluid interaction but the adopted constitutive model cannot reproduce

properly the generation of excess pore water pressure induced by strong earthquakes. When the overall response of a dam has to be numerically reproduced "advanced constitutive law" should be adopted as done by Elia et al. 2011 (Geotechnique 61(7) 549-563), Sica et al. 2008 (Computers and Geotechnique, 35, Issue 1, 61-85), Lacy & Prevost 1987 (Soil Dyn Earthq Eng. 6(1):48–63), Sica & Pagano 2009 (SOILS and FOUNDATIONS 49(6), 921-939). The Authors cited only two works which are not pertinent with the scope of the paper (earthquake response of earth dams), i.e. Costa and Alonso 2009; Seo and Ha, 2009, which regard an advanced computation under static conditions.

The paper does not illustrate how soil damping was modelled and related to the shear strain induced in soil by the earthquake.

An arbitrary selection of the input motion has been carried out without providing any seismological information

8. Does the title clearly and unambiguously reflect the contents of the paper?

Yes

9. Does the abstract provide a concise, complete and unambiguous summary of the work done and the results obtained?

Yes

10. Are the title and the abstract pertinent, and easy to understand to a wide and diversified audience?

Yes

11. Are mathematical formulae, symbols, abbreviations and units correctly defined and used? If the formulae, symbols or abbreviations are numerous, are there tables or appendixes listing them?

In part

12. Is the size, quality and readability of each figure adequate to the type and quantity of data presented?

Yes

13. Does the author give proper credit to previous and/or related work, and does he/she indicate clearly his/her own contribution?

References are poor. Some minor works are cited without quoting the principal ones. For example, the authors cite a PhD thesis (Chen, 1995) and do not cite Seed 1979 (Geotechnique 29(3):215–263) in which the failure mechanisms of earth dams were firstly defined.

14. Are the number and quality of the references appropriate?

In part. Some important works on numerical computation of earth dams from the construction stage up to the earthquake are ignored.

15. Are the references accessible by fellow scientists?

Yes

16. Is the overall presentation well structured, clear and easy to understand by a wide and general audience?

Yes

17. Is the length of the paper adequate, too long or too short?

Adequate

18. Is there any part of the paper (title, abstract, main text, formulae, symbols, figures and their captions, tables, list of references, appendixes) that needs to be clarified, reduced, added, combined, or eliminated?

Yes, § 2.3 Numerical model and parameters. Furthermore, what does it mean "The Young's moduli were chosen more closely to reality"? Which kind of tests was done to measure the initial stiffness of soils constituting the dam? This is a very crucial point for zoned earth dams, as high as the dam at hand.

19. Is the technical language precise and understandable by fellow scientists?

Yes

20. Is the English language of good quality, fluent, simple and easy to read and understand by a wide and diversified audience?

Yes