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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Simplified approach for locating the critical probabilistic slip surface in limit equilibrium analysis" *by* Y. M. Cheng et al.

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Reply to reviewer's comments

The authors would like to thanks the reviewer for the valuable comment, and would like to respond to the comments as follows (the section marked in blue are the revisions): 1. As mentioned in the text several times, this method is not rigorously proved, but has been demonstrated by the examples in this paper as well as many internal studies to be useful and practical. The proposed method can provide a good "engineering" solution within a very short time as compared with the "rigorous" solution which requires a very long computation and is not suitable for routine engineering design. In fact, the authors have reiterated in the revised manuscript (blue section) that this

method has been used for many slope design in Asia due to its reliability and being fast in computation. Furthermore, the authors have also mentioned several times that other than two samples, the user can actually choose the number of samples to be used for general application. The authors have chosen two samples for illustration in the paper, as the authors have found that two samples are generally good enough for most of the practical problems. The proposed method is not meant to be a "rigorous" method, but is a fast method which is good enough for engineering use, particularly when the variation of the soil parameters are actually much more critical problem in the analysis, not to mention the limitation of the factor of safety determination by limit equilibrium method. From the view of an engineer (as the proposed method is tailored to engineering use), the proposed method is sufficiently good for engineering application, and this is the reason why this method is actually used instead of those mathematically more "rigorous" method. 2. The detailed literature review in this paper can be a good reference to those who are not familiar with this topic, particularly many new works are also considered. While I have no strong view on this section, I "prefer" to keep this section if possible, as this section can benefit many of those who are not particularly familiar with reliability in slope analysis. If I remove this section, the previous reviewers may also comment that I do not have adequate literature review, which is a situation for which I have come across many times (different views from different reviewers). I am however "open" to this comment, and can remove this section if there is a strong view. 3. I have added a short section on Harmony search method, together with some additional references. 4. I have added comments on the Load factor method which is a popular method in Asia, and this method is used by many engineers for slope design. 5. The proposed method is in a separate section outlined in the section "Proposal for rapid analysis". It is now re-elaborated in the revised manuscript. The authors have added a short section about the two examples, and have given a heading so that it is easier for the readers to differentiate the results from the two examples. In the section for "Proposal of rapid analysis", the authors have added section heading for individual examples. Readers will be able

to look at individual example easily for assessment. The heading for every major section is underlined, and the reader can easily pinpoint to a specific section in the revised manuscript. 6. I have added reference to equation (8), and the details can be found in the two references. Particularly, the book by Chen (2003) has a chapter specially devoted to the reliability study of slope analysis, and eq.(8) and (9) are also adopted directly by them. The classical reference by Ang and Tang (1984) can also be consulted for details.

Please also note the supplement to this comment:
http://www.nat-hazards-earth-syst-sci-discuss.net/3/C1605/2015/nhessd-3-C1605-2015-supplement.pdf

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Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 3, 1061, 2015.