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Discussions

Interactive comment on "Modeling root reinforcement using root-failure Weibull survival function" *by* M. Schwarz et al.

Anonymous Referee #3

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When reviewing this manuscript (ms) I did not read the review of the two other reviewers.

The ms describes root reinforcement modeling using the so-called Fiber and Root Bundle Model (FBM, RBM) approach and specifically addresses the quantification of the variability of the root mechanical strength. The authors have published a lot on this topic, are the leading researchers in this field and have published numerous high quality papers on the development of the FBM / RBM. The current ms presents some new laboratory root strength tests and introduces a Weibull survival function to describe partial root failing as function of root diameter and root-strength variability at identical root diameter.

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General review: The ms has been submitted to HESSD and this journal is aimed at water processes and water resources in interaction with earth scientific processes (http://www.hydrology-and-earth-system-sciences.net/home.html). The current ms has no link to hydrology and is a fully devoted to root mechanical strength. This reviewer does not see a link to hydrology. The ms is in my opinion badly placed in HESS.

Beside that I think the ms has important shortcomings:

- In my opinion the ms contains too limited novelty in the field of root reinforcement modeling. The improvement of the FBM with this Weibull survival function is interesting but not well elaborated. It is a two-parameter distribution of which the scaling is done with a fitted max displacement at failure and Weibull exponent (w) fitted (by eye?) on the selected data. No argumentation is given why this function is selected, why it should be suitable to quantify root reinforcement and variability of mechanical root strength.

- The novel lab and field data consists of 43 roots for lab tensile strength tests ('fine roots' of 0.6-2.8 mm diameter). The rest of the data used for analysis has already been published. The larger diameters stem from previous tests of other locations but the same species (Picea abies, Norway Spruce). Although interesting, not the core data for hydrological research. The analysis is further done with the compound data set: it is unclear what is the effect of the merging of root strength tests on what in the ms is called "calibrated root parameters".

- The Calibration of the survival function is done in 4 lines and two figures but is unclear to me: how is it done and why is w of 2.3 or 2.4 the best fit?

- The same holds for the discussion on 'fitting' using Microsoft Excel or R software. Although some results are given it is totally unexplained how the fit is done, which methods and why R and Excel give different results. For me this discussion is disconcerting.

- Lastly, the conclusion section does not contain conclusions but rather new points for

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discussion or unsupported statements (RBMw can be implemented in SO Slope is not described nor discussed in article; same method can be applied for root reinforcement under compression is nor described nor discussed in ms; influence on trigger conditions idem ditto; results A3 is first presented in conclusion section; and so on)

Overall, and in my opinion, the ms does not address hydrological issues, has limited added value over the existing, high quality papers published by this group, and lastly is too lean in method and analysis.

I recommend rejection of the ms and would advice resubmission only if the three major points summarized above are addressed fully and – as the ms was submitted to HESS – if the authors would reflect on the hydrological consequences of their work.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 3843, 2013.