

REVIEW

on article

Experimental Study on the Mechanical Properties and Water Stability of Microbially Cured, Coir-Fiber-Reinforced Clay Soil

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SUMMARY

The article submitted for review is relevant. An experimental study on the mechanical properties and water stability of microbially-cured, coir-fiber-reinforced clay soil was carried out. The relevance of the study lies in the need to use environmentally friendly methods of strengthening soils, stabilizing them using new approaches and methods. The authors presented a new method that allows solving engineering problems and contributes to greening. They presented an interesting methodology and obtained a number of important results. Thus, having benefited from the combination of calcium carbonate precipitation and fiber reinforcement technologies, significant improvements have been obtained to improve the safety of engineering structures. Thus, the reviewer believes that the article is interesting and relevant. The reviewer supports the article, but considers it necessary to correct a number of comments, they are listed below.

COMMENTS

1. The authors indicate in the title that these are experimental soil studies. Maybe the authors should remove the word "experimental" from the title to increase the significance of the article. Otherwise, it may seem that in this article only laboratory experiments were carried out, although the authors also analyzed the results, as well as SEM analysis using microscopy, and in general, data processing also plays a big role. It is recommended to remove the word "experimental" from the title.

2. The abstract is not entirely successful. The authors immediately report scientific novelty, but do not say what scientific problem they faced. The scientific problem should be formulated at the beginning of the abstract.

3. The conclusions at the end of the abstract should be stated in a slightly different form so that the quantitative characteristic of the result completes the abstract. The authors first have a quantitative characteristic of the result, and then a qualitative one, this is not entirely true. All numbers and values should be at the end of the abstract.

4. In the "Introduction" section, the authors provide a literature review. But here the reviewer notices that it is rather superficial and shallow. The authors should work on a literature review, in particular, an interesting direction is the use of plant fibers: coconut, sisal and other types in heavy and cellular concrete. That is, the authors should report what work was done on other materials with reinforcement with coconut fibers and sisal fibers. It is recommended to pay attention to cellular concrete and heavy concrete. Also, authors are invited to add 8-10 references on this topic. Also, the authors should pay more attention to the work related to the saturation of concrete with microorganisms. The fact is that building soil or concrete, as well as other building materials, are composites that can be improved by using microorganisms in them. The authors should mention this and not focus their attention only on soils. This will make it possible to give this method a multifunctional meaning and expand the engineering task of the authors.

5. In section 2 "Experimental Materials" I would like to wish the authors to provide photographs in a higher quality and possibly justify the choice of materials in a little more detail.

6. There are comments on the figure 2. This photo is made in poor quality.

7. Figure 3 looks interesting but is poorly described in the text.

8. The graphs presented in figures 4-7 need more detailed interpretation.

9. The graph in Figure 8 looks not very informative. The same remarks apply to numerous graphs in the further presentation of section 3.

10. Section 3 also presents microstructural analyzes using the SEM method. I would like to see a more detailed interpretation of the SEM analyzes presented. I would like to understand how the authors see the phase boundary between the soil and the fiber, whether any fibers undergo deformations when working in the soil under various loads, and how the authors can describe the ways the fibers are distributed in the soil from the point of view of SEM analysis. Here, a very important point is to pay attention to the forces that the fibers perceive in the reinforced soil, as well as microcracking at the phase boundary and fixing or anchoring these fibers in the soil body. The authors are encouraged to provide a detailed comparison of the model they obtained in the course of this experiment at the micro level with the model of the operation of such fibers in other composites, for example, in concrete. That is, how a soil reinforced with fibers and having stabilizing additives performs under load, as it relates to other composites reinforced and formulated in the same way. For example, to make a comparison between soil and heavy concrete or soil and cellular concrete, which will be more comparable in terms of fiber pulling forces or phase boundaries due to the high porosity of cellular concrete reinforced with coconut fibers or sisal fibers. Such a discussion, added to the text, will help to better compare the result obtained with the results of other authors and improve the scientific idea and quality of the article.

11. The conclusions presented by the authors should be specified in terms of the scientific result obtained, the prospects for the development of the study and the scope of this result. The list of 28 references is very small. It should be supplemented with another 15-20 points.

In general, the reviewer believes that the article is done at a high level, and after correcting the comments, the reviewer would like to take a look at this article again. The article should be supplemented in terms of comments and submitted to the reviewer for another review. General note: major revisions.