AUTHORS' RESPONSE TO REVIEWER #1'S COMMENTS

MS #: polymers-2173831

Title of the MS: Bond behavior of a steel rebar embedded in PVA cementitious composites with CNTs

Authors: Dongmin Lee, Seong-Cheol Lee, and Sung-Won Yoo

The authors appreciate the comments of the reviewer. Please see the authors' responses to the reviewer's comments as follows:

The study attempts a detailed experimental and analytical investigation on the behavior of PVA fiber reinforced cementitious matrix. However, the limitations of the present work is of two folds:

1. The paper is limited only understanding the bond behavior of PVA based cementitious system which is not sufficient for a standard journal article. Moreover, the test parameters considered in the study are very limited and not exhaustive.

This paper focused on the bond behavior of a rebar embedded in PVA cementitious composites with CNTs. To investigate the effect of CNTs, 4 levels of CNTs wt.% were considered in the test program. In addition, as similar with the conventional pull-out test, rebar diameter was considered as a parameter. Consequently, total 36 specimens were tested.

Based on the authors' survey, this paper is the first to investigate the effect of CNTs on the bond behavior of a rebar embedded in PVA cementitious composites.

2. What is the novelty of the proposed work? A number of previous studies have already attempted the use of PVA based system. If the authors claim that they study the interaction between PVA and CNC system, then they fail to do it by a large margin.

The originality of this paper is the consideration of the effect of CNTs on the bond behavior of a rebar embedded in PVA cementitious composites. Although many studies already have been conducted with PVA cementitious composites, no research is available on this specific topic, according to the authors' survey.

From the test results obtained by the authors, the bond strength of a rebar increased as the CNTs mix ratio increased. It is inferred that higher bond strength could be attained with the cementitious composites strength enhanced by CNTs.

To clarify the novelty of the manuscript, the chapter, Research significance, has been added in the manuscript, as following:

> *3. Research significance*
>
> *Recently, several types of research were conducted to investigate the material behavior of cementitious composites with fibers and CNTs together to take all the advantages before and after cracking. However, there*

are few studies on the bond behavior of rebar in cementitious composites containing both fibers and CNTs. In this study, an experimental program has been conducted to investigate the bond behavior of a rebar embedded in PVA cementitious composites with CNTs. From the pull-out test, the bond stress-slip behavior was measured so that the effect of the rebar diameter and CNTs mix ratio could be evaluated. Based on the test results, a new simple bond stress-slip model has been proposed. As the interaction between cementitious composites and rebar is significant in the structural behavior, the test results and the proposed model will help to predict the structural behavior of PVA cementitious composites with CNTs.

3. What is the need for a new analytical model since number of previous bond stress models are suggested by the code itself. It looks like a new model is proposed for the sake of proposing. If the model is really essential, a proper scientific justification is to be provided.

Number of previous bond stress models are mostly designated for the bond behavior of a rebar embedded in ordinary concrete containing coarse aggregate. As compared in the manuscript, the existing model considerably overestimated the actual bond behavior of a rebar embedded in PVA cementitious composites with CNTs.

As many researchers did, the simple model has been developed from the test results; consequently, the proposed model showed good agreement with the test results. The authors dare to say that the proposed model can be employed to analyze the tensile behavior of CNTs-reinforced PVA cementitious composites containing rebars.

4. In continuation with the above comment, the validity of the proposed model is to be verified with the existing literature works. Also, a detailed parametric study is essential.

As commented in the authors' response to the reviewer's comment 2, no literature was found to present the bond behavior of a rebar embedded in PVA cementitious composites with CNTs.

Generally, rebar diameter and cementitious matrix strength are considered as test parameters on the pull-out test. In this study, rebar diameter and CNTs mix ratio were considered as test parameters since this study adopted PVA cementitious composites commercially used in South Korea. The authors dare to say that further study is required to investigate the effect of cementitious matrix strength on the bond behavior of a rebar.

5. Failure mode images presented in Figure 6 does not apparently highlight the type of failure observed. Provide better images for the same. Moreover, improve the conclusion section which looks like a mere summary.

In the pull-out test, the failure mode can be categorized into two, depending on whether splitting cracks occur or not. Figure 7 (in the revised manuscript) showed no splitting crack after the pull-out test, which indicated that frictional pull-out failure occurred.

Conclusions have been revised, especially focused on the effect of the test parameters separately. Conclusion 2) describes the effect of the rebar while conclusion 3) describes the effect of the CNTs on the bond behavior of a rebar embedded in PVA cementitious composites.

For the above reasons, the paper cannot be considered for publication in present form and requires significant enhancement or revisions. Hence, the manuscript is to be declined with no encouragement to re-submit.

The manuscript has been revised accordingly. Please see the revised manuscript.