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Cracow University of Technology,

Dean's Office of the Faculty of Civil Engineering,

Below is my review of the doctoral thesis entitled "Infill structures protected against seismic excitations by polyurethane flexible joints" by Ahmet Tugrul Akyildiz.

The topic studied is very interesting and important. The recent earthquakes in Turkey have once again demonstrated the importance of the chosen topic. It was determined that 20,662 buildings collapsed in 11 provinces affected by the last earthquakes in Türkiye. Within the scope of the damage assessment studies, it was determined that 105,794 buildings were heavily damaged and collapsed, requiring immediate demolition. It was verified that 24,464 buildings were moderately damaged, 205,86 were slightly damaged, and 407,786 were undamaged. Unfortunately, almost all these buildings suffered partition wall damage. The main reason for this overfrequent damage is that infill walls are put up adjacent to the reinforced concrete frame system. Therefore, infill walls are exposed to significant forces during earthquakes.

First of all, it is recommended to review the language of the thesis in terms of grammar and sentence structure. Although the English of the manuscript is as understandable as possible, there are many grammatical errors, such as using articles. Spelling and language-checking programs are now easily accessible for free. For the sake of example, I tried to fix the Abstract, Chapter 1, and Chapter 7 with minimal modifications.

It was suitable to conduct material tests with bricks before the main experiments. This study provided a reasonable basis for the analytical part. Giving the material information regarding the experiments in a tabulated format would be appropriate. For example, I could not see the concrete compressive strength of the frames on the test day.

The thesis has no information or photographs regarding the lateral displacement measurements in the experiments. It is not understood how these measurements were made. The information provided in a thesis must be complete. Experiments by someone else should be able to be repeated without any problems with the information given in the

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thesis. Similarly, how or even why the out-of-plane resonance frequency tests were carried out is not understood.

I would expect the observations during the experiments to be given in detail. For example, information such as when the first crack appeared in Frame A and when the damages exceeded the serviceability limit state is crucial. Because I think early cracking of infill wall problems have been resolved in Frame B and C with the proposed application.

Load-displacement curves indicate no load decrease. Therefore, I would expect the experiments to be carried out to larger drift ratios.

The Frame B test has been prepared very cleverly. With this test, it is shown how to apply the proposed solution to existing structures.

In terms of stability control of the proposed method, it would be great to see quasi-static out-of-plane loading tests performed on the infill walls. However, shaking table experiments close this gap.

The summaries at the end of each section were helpful in understanding the thesis.

Shake table tests have been particularly important for understanding the out-of-plane behavior of infill walls. The proposed polyurethane flexible joints (PUFJ) solution is an easy-to-implement method. Shaking table experiments have clearly demonstrated the success of this proposal both under in-plane and out-of-plane excitations.

In addition to experimental studies, a considerable analytical study was also carried out in the thesis. Nonlinear finite element analysis is a complicated method to perform. Many parameters need to be arranged. Similar difficulties are also observed in this study. Especially as the drift ratio increases, the difference with the actual test results increases. The difference is enormous in the pushing direction. Unfortunately, no decrease in load is observed in the numerical analysis results. Analyzes reveal the success of Frame B and C similar to experiments. In addition, the results of the 3D tests were obtained with an acceptable accuracy by finite element analysis.

Nonlinear finite element analysis is a complicated method to implement and is unsuitable for daily life. In this thesis, a simple equivalent strut has been developed admirably to overcome this difficulty. As a result of modeling with the simple method, very successful results close to the experimental behavior were obtained.

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The effect of the proposed flexible joints was examined by analyzing a 4-story residential building with the simple strut approach. This study demonstrated the success of infill walls, especially the proposed flexible infill wall connection.

In conclusion, a serious study was conducted, and a thesis was presented as a result of this study. A significant amount of experimentation has been done. A considerable amount of analysis was also performed. As a result of these studies, a very successful flexible connection between frames and walls is proposed. In addition, a strut element is offered for the analysis to apply this connection type to the design successfully.

For the reasons mentioned above, I think this research is sufficient and successful for a doctoral study. In conclusion, I would like to clearly state that it would be appropriate for doctoral candidate Ahmet Tugrul Akyildiz to defend his doctoral thesis publicly.

Best Regards,

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