

## ***Interactive comment on “Review of fragility analyses for major building types in China with new implications for intensity-PGA relation development” by Danhua Xin et al.***

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The paper essentially aims the development of intensity-PGA relationships using a novel method that relies on comparison of intensity-based empirical and PGA-based analytical fragility relationships for the same building types from China. To fulfill this object, the authors first review the empirical building fragility database, mostly for China, scrutinize the data and derive the median Chinese intensity-based fragility relationships with basic treatment of uncertainties. For this empirical fragility study, three types of masonry buildings with different construction practices are considered. Secondly, the authors inspected publications that provide PGA-based analytical fragility functions

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(dependent on PGA) for the same damage classes and building categories. Thus, a solid fragility database and median fragility relationships, based on both intensity and PGA, areas established for mainland China. For the derivation of median fragility relationships, the lognormal distribution is used with excellent goodness of fit. The paper culminates with the description and application of the novel approach for the development of the intensity-PGA relation by using fragility as the transfer medium. The results obtained are very valuable and compare well with limited relationships based on direct regression of measured PGA with the assessed intensity values. The specific issues with the paper can be listed as follows: • Very comprehensive literature review and description of ingredients and methodology on the assessment of fragility relationships from empirical data. • Text can be shortened since involves several repetitions of the objectives and methodologies. • With the exception of the information provided on general approaches on the derivation of analytical vulnerabilities, not much detail is provided on the papers that the PGA-based analytical fragilities for the Chinese building stock. It appears that, with the exception of outlier removal, results on all these papers are given the same weight for the median fragility assessment. • The uncertainties in the fragility assessments are not adequately covered in the paper with the exception of uncertainties illustrated in Appendix Fig. A1-A4 and Table B1). • Direct comparison of different fragility relationships is a difficult issue due to different building, damage state and ground motion intensity definitions and attributes considered in these relationships. This fact also manifests itself in this paper. Upon comparison of fragility relationships obtained in this paper with the results of several relevant international projects, only one (HAZUS Project) similarity for “Masonry – A” building type was found. • The intensity-PGA relationships developed by using the correspondence between the empirical and PGA-based analytical fragility relationships is based on a novel approach and would be very valuable for use in international projects. However, a description on the relationship between the Chinese Official Seismic Intensity Scale (GB17742) and the other internationally adopted scales (e.g. MMI, MSK, EMS) may need to be included (or referenced) in the paper. • The methodology in the

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transmission of uncertainty from empirical/analytical fragility database to the intensity-PGA relation is provided in Appendix C. This transmission of uncertainty is important and should preferably be integrated into the main text of the paper.

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