



JRA5: VULNERABILITY ASSESSMENT FROM FIELD MONITORING

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Due to missing information about the structural systems of historic buildings the vulnerability can be hardly assessed by traditional methods such as an inspection. The question of material parameters also leads to problems. A combined numerical – experimental analysis is the most promising approach to assess these objects. Therefore in situ measurements of brick-masonry buildings in Vienna, Istanbul and Bucharest were executed. Accelerometers placed on every storey on top of each other were recording the impact of ambient and transient excitation. Evaluation of the recorded vibration response renders the dynamic parameters such as natural frequencies and mode shapes. With these data the computer simulation was updated and the differences between the model and reality could be minimized.



Figure 1. Field monitoring campaign

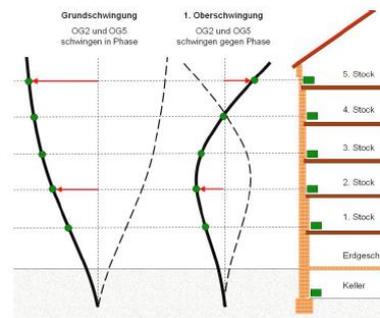


Figure 2. Monitored mode shapes

Moreover it is of primary interest to quantify the contribution of non-structural walls to the seismic resistance of a building. The same problems of unknown structure and material parameters of historic buildings appear.

In a unique opportunity, a 150 year old brick masonry building in the city of Vienna was provided for research purposes before it was demolished. Measurements in both states of the building – with and without partition walls – showed that the internal and external load bearing walls are coupled through the timber ceiling and roof construction. A three dimensional finite element model was generated. With the results from the former measurements the material parameters could be calibrated effectively. After that the stiffness with and without partition walls was estimated. A global lateral stiffness reduction of about 57% emerged. In a next step fragility curves were computed for this

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building. It could be shown that measurements can improve the quality of the fragility curves considerably. This subject is still under development.

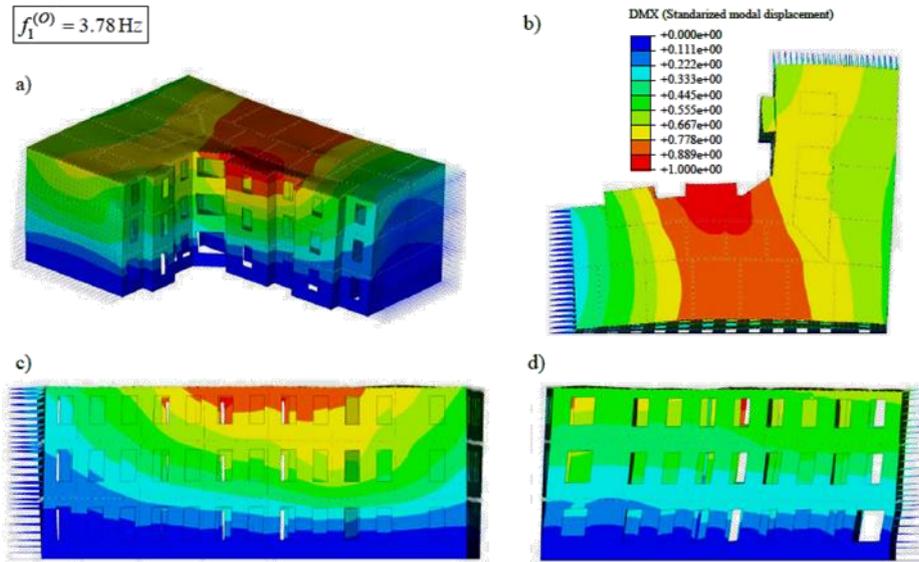


Figure 3. Simulation

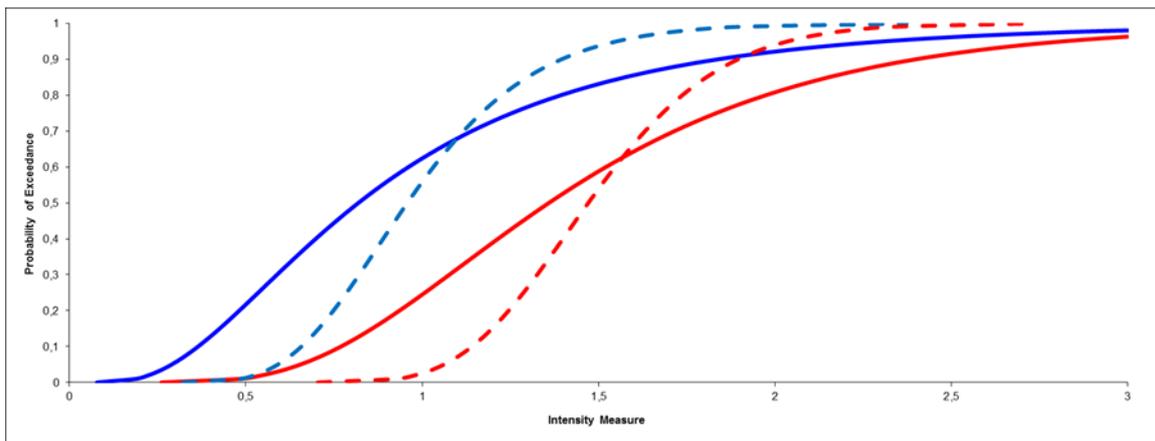


Figure 4. Determined fragility curve

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