



FIELD SHEAR TESTS ON A PARTITION WALL OF AN EXISTING UNREINFORCED BRICK MASONRY BUILDING

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Most of the historical architectural heritage of large European cities dates back to the second part of the 19th century and the first 30 years of the 20th century. The structures erected in this time are mainly unreinforced brick masonry buildings designed without any criterion of earthquake resistance. In order to preserve the historical identity of these cities and adapt the existing living units to the current living demand these brick masonry buildings are more and more often retrofitted after the assessment of their load-bearing capacity.

One of the most frequent retrofitting interventions in this kind of existing structures is the partial or total demolition of some partition walls. In the practice the demolition is preceded by assessment of the wall load-bearing capacity estimated by means of well-known analytical models [1] and design of strengthening structures. These analytical models of shear walls are based on macro-scale masonry model calibrated through complex homogenization methods of firstly micro-scale masonry model and after meso-scale masonry model [2]. The homogenization process defines the characteristics of the homogeneous orthotropic elasto-plastic material from the material and geometric characteristics of the single components of the masonry: bricks and mortar. The material characteristics of bricks and mortar of existing brick masonry structures are defined through laboratory tests on original samples extracted from the building, while the geometric characteristics are known from old building standards and field measures. The homogenization process that identify the macro-scale behaviour of the masonry from the characteristics of the single components of the masonry is based on analytical studies verified with numerical simulation and laboratory tests on specimens made of original bricks and mortar reproducing the chemical characteristics of the original one. In spite of use of the original bricks and the mortar similar to original one, the specimens could exhibit some differences from the real walls due to the age of the mortar and the masonry manufacture, so the shear load-bearing capacity of a real partition walls could differ from the one estimated with analytical models and material characteristics identified through the homogenization process.

This work proposes the first results of a set of destructive field shear tests conducted on a partition wall of an unreinforced brick masonry Wilhelminian-style structure in Vienna (Figure 1). The main aim of these tests is to validate the results of the homogenization process proposed for brick masonry of this kind of old Viennese buildings [3] by comparing the load-bearing capacity resulting from the field tests on the partition wall with the results of numerical simulation carried out on a Finite Element Model (Figure 2). The model of the unreinforced brick masonry verified with the field testing data improves the seismic vulnerability assessment of the whole structure.

This work states also the difficulties to set up and carry out a destructive field shear test respect to a laboratory shear test on masonry panels.

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Figure 1. Field test

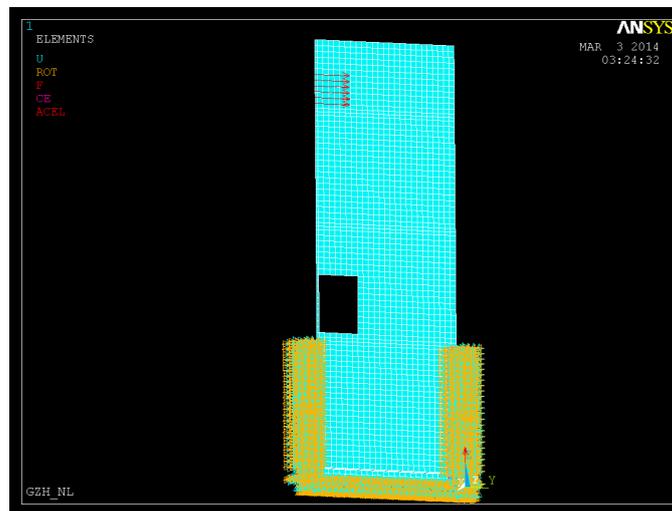


Figure 2. Finite Element Model

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