

Effect of historic timber roof structures on the structural behaviour of masonry buildings during seismic events

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ABSTRACT

Roofs are complex elements of heritage structures which are not only meant to protect the building from exterior methodological factors but are also defining the skyline of a city while highlighting the importance and aesthetics of the building they belong to. However, in seismic areas, roof structures prove out to either trigger the out-of-plane behavior of historic masonry buildings [1] or reduce the horizontal displacement, depending on their type and their connection to the masonry walls [2].

The study is therefore aiming do highlight the effect of common roof structure types from Timisoara, a city placed in the western part of Romania, subjected to shallow perfect earthquakes, on the seismic behavior of a local type of masonry structure, with a ground-floor and 2 upper floors, from the 18th century.

Throughout the study 3 different types of roof structures were placed on the same masonry building and the out-of-plane horizontal displacement, inter-story drift, damage level and internal forces where assessed. The main scope of the study is to highlight how the chosen roof structures from the 18th, 19th and 20th century, would influence the behavior of a masonry building during seismic events. Detailed numerical simulations using finite element models of the building and the three roof structures were performed in order to obtain the four assessed parameters, which prove that depending on the connection to the masonry walls and the state of conservation of the timber elements, roof structures would significantly improve the seismic behavior of historic masonry buildings in this area.

REFERENCES

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