

# Numerical modelling of the seismic performance of Romanian traditional timber-framed buildings

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## ABSTRACT

Traditional architecture made of timber-framed masonry (TFM) system is widespread around the world and has already been recognized as a unique cultural heritage to be preserved. These structures have shown a good seismic performance compared to other typologies because their configuration and construction details were constantly updated as soon as the builders addressed the causes of damage mechanisms when earthquakes occurred [1]. Regarding this typology, Romanian TFM structures can be considered a representative example also because they experienced several seismic events showing their good earthquake-resistance. Although these buildings are still constructed and inhabited nowadays, no recommendation is provided in the Romanian building code and its structural behaviour is not properly characterized yet. Bearing in mind that the building's global response depends on many parameters such as the performance of its structural elements and their interaction, the calibration of shear walls is crucial to define the non-linear behaviour under cyclic loading. A simplified modelling strategy was chosen to simulate TFM wall response consisting of an equivalent frame with linear elastic elements and non-linearities lumped at the joints by using OpenSees software. After calibrating the wall response according to experimental campaign performed at Technical University of Civil Engineering of Bucharest [2], the seismic performance of a representative Romanian TFM building was evaluated by carrying out non-linear static analysis to assess the maximum shear and deformation capacity and predict some local failures at the timber joints. The dynamic properties of this building were calibrated as well according to the ambient vibration tests by [3]. Moreover, a parametric analysis on the TFM wall was performed by varying the arrangement of diagonal elements that have a great influence the shear behaviour of the wall.

## REFERENCES

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