

## ABSTRACT

## Parametric Study of Orthotropic Masonry Walls Subjected to In-Plane Loading Through Numerical Modelling

M. Smilović Zulim1

1University of Split, Faculty of Civil Engineering, Architecture and Geodesy, Matice hrvatske 15, 21000 Split, Croatia.

Masonry buildings, and therefore masonry structures, are probably the most numerous in the history of architecture. Masonry walls are complex anisotropic composite structures composed of masonry and reinforced concrete elements, including horizontal and vertical beams, foundations etc. Generally masonry structures usually have a more complex behaviour and require more complex engineering calculations and numerical models than pure concrete structures.

The numerical study is performed through the numerical model based on the finite element method presented in [1, 2] Planar 2D and 1D finite elements were used for spatial discretization and explicitimplicit time integration for the time history analysis. The model is simple and primarily intended for practical application. It can simulate the main material and geometric nonlinear characteristic of planar concrete and masonry structures subjected to in-plane loading. The constitutive material models are the same for static and dynamic analysis, ie.

After validation of the numerical model, a parametric study was performed for the assessment of the influence of different parameters on the behavior of masonry wall under static and dynamic loading. These parameters include the compressive, tensile and shear strength of masonry, modulus of elasticity and shear modulus of masonry, tensile and shear stiffness of masonry, the height to length ratio of walls, openings in walls, the intensity of vertical load, vertical tie and horizontal ring beam, the deformability of the subsoil, duration, period and amplitude of dynamic excitation etc. [2] The results of the numerical tests performed were thoroughly analyzed, and the main conclusions of the study are presented at the end.

[1] Radnić, J. et al. Numerical Model for Static and Dynamic Analysis of Masonry Structures. (2011). Građevinar, 63(6), 529-546. doi: 10.1007/978-3-642-31497-1\_1

[2] Smilović M. Behavior and numerical modeling of masonry structures under static and dynamic load, PhD Thesis, Split, Croatia 2014.

ACEX2025 in Naples, Italy