

# AUTOMATED MODEL UPDATING OF A MASONRY HISTORICAL CHURCH BASED ON OPERATIONAL MODAL ANALYSIS: THE CASE STUDY OF SAN GIOVANNI IN MACERATA

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## Abstract

*During the last decades, conservation and structural safety assessment of historical buildings gained great importance, in particular, the prediction of the dynamic response of historical masonry constructions plays a central role in the structural analysis. In this scenario, finite element modelling proved to be the most common and available approach to study the behaviour of complex masonry structures, however the gap between numerical and experimental analysis may lead to erroneous results.*

*The paper describes the model updating procedure applied to the finite element model San Giovanni's church in Macerata, condemned in October 2016 after the Central Italy Earthquake.*

*The laboratory of Proof and Research on Structures and Materials of Roma Tre University carried out an extensive in-situ testing campaign – including geometric survey, video endoscopy, flat-jack test, sonic tomography and ambient vibrations test – to investigate the state of the building. The work involved both analytical and experimental analysis: the results of the testing campaign were interpreted and correlated with accurate finite element models developed with the software Midas Gen [1]. Operational modal analysis with the software Simcenter Testlab [2] was applied to extract the modal parameters of the building (modal frequencies, shape vectors and damping). Material's characteristics and boundary conditions were updated according to the Douglas-Reid method. The final model was then compared with the initial model to comprehend and discuss the updating steps.*

## References

- [1] MIDAS Information Technology Co., Ltd., «Gen 2015 (v1.1),» 7.31, 2015.
- [2] Siemens Industry Software NV, «Simcenter Testlab Version 18.0,» 2018.

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