



Experimental evaluation of natural period of masonry and reinforced concrete structures during operative conditions

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This work focuses on the experimental evaluation of the fundamental period of buildings of various types (masonry and reinforced concrete) using measurements of ambient vibrations on real buildings located in Basilicata (Italy) and numerical analyses. The results are compared with the simplified formula provided by the Seismic Italian Code (NTC2008), that is function of structural typology and height for both near collapse and limited damage limit states and experimental results provided by the recent scientific literature. With the intention of proposing simplified relationships to evaluate the fundamental period of buildings, several numerical and experimental campaigns, on different structures all around the world, have been carried out in the last years in order to calibrate different kind of formulas. Most of formulas retrieved from both numerical and experimental analyses provides vibration periods smaller than those suggested by the NTC2008. However, it is well known that the fundamental period of a structure play a key role in the correct evaluation of the spectral acceleration for seismic static analyses. Generally, simplified approaches impose the use of safety factors greater than those related to in depth nonlinear analyses with the aim to cover possible unexpected uncertainties. Using the simplified formula proposed by the Italian seismic code the fundamental period is quite higher than fundamental periods experimentally evaluated on real structures, with the consequence that the spectral acceleration adopted in the seismic static analysis may be significantly different than real spectral acceleration. This approach could produces a decreasing in safety factors obtained using linear seismic static analyses.

Based on numerical and experimental evidences, the authors suggest a possible update of the seismic codes formula for the simplified estimation of the fundamental period of vibration of existing masonry and RC buildings.

Acknowledgements

This study was partially funded by the Italian Civil Protection Department within the project DPC-RELUIS 2015 - RS4 "Seismic observatory of structures and health monitoring".