

## **Comparison of fundamental natural period of masonry and reinforced concrete buildings retrieved from experimental campaigns performed in Italy, Greece and Spain**

Antonella Nigro (1), Felice C. Ponzo (1), Rocco Ditommaso (1), Gianluca Auletta (1), Chiara Iacovino (1), Domenico S. Nigro (1), Pantelis Soupios (2), Mariano García-Fernández (3), and Maria - Jose Jimenez (3)

(1) University of Basilicata, School of Engineering, Potenza, Italy (antonella.nigro@unibas.it), (2) Technological Educational Institute of Crete, Department of Environmental and Natural Resources Engineering, Greece , (3) Spanish National Research Council, Departamento de Geología Spain, Madrid

Aim of this study is the experimental estimation of the dynamic characteristics of existing buildings and the comparison of the related fundamental natural period of the buildings (masonry and reinforced concrete) located in Basilicata (Italy), in Madrid (Spain) and in Crete (Greece). Several experimental campaigns, on different kind of structures all over the world, have been performed in the last years with the aim of proposing simplified relationships to evaluate the fundamental period of buildings. Most of formulas retrieved from experimental analyses provide vibration periods smaller than those suggested by the Italian Seismic Code (NTC2008) and the European Seismic Code (EC8). It is known that the fundamental period of a structure play a key role in the correct estimation of the spectral acceleration for seismic static analyses and to detect possible resonance phenomena with the foundation soil.

Usually, simplified approaches dictate the use of safety factors greater than those related to in depth dynamic linear and nonlinear analyses with the aim to cover any unexpected uncertainties. The fundamental period calculated with the simplified formula given by both NTC 2008 and EC8 is higher than the fundamental period measured on the investigated structures in Italy, Spain and Greece. The consequence is 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 results, in order to confirm the results proposed in this work, authors suggest to increase the number of numerical and experimental tests considering also the effects of non-structural components and soil during small, medium and strong motion earthquakes.

### **Acknowledgements**

This study was partially funded by the Italian Department of Civil Protection within the project DPC-RELUIS 2016 - RS4 “Seismic observatory of structures and health monitoring” and by the “Centre of Integrated Geomorphology for the Mediterranean Area - CGIAM” within the Framework Agreement with the University of Basilicata “Study, Research and Experimentation in the Field of Analysis and Monitoring of Seismic Vulnerability of Strategic and Relevant Buildings for the purposes of Civil Protection and Development of Innovative Strategies of Seismic Reinforcement”.