Crescenzo Petrone – CV

University of Napoli; Federico II
Research associate University College London

Crescenzo Petrone received from University of Naples, Italy, the Bachelor of Science degree in Civil Engineering in 2008, the Master of Science degree in Structural and Geotechnical Engineering in 2010 and the Doctor of Philosophy degree in Seismic Risk in 2014.
He is currently Research Associate in tsunami and earthquake engineering at University College London, after being Post-Doc Research Fellow at the University of Naples (Italy). In 2010 he has been a visiting student at the University of Ljubljana, where he studied for his MSc thesis. He has been a visiting research scholar at the University at Buffalo (US), thanks to a scholarship for a 6-month research period, after the completion of the PhD (June 2014 – December 2014).
His research studies focus on different topics of Earthquake Engineering, such as the performance of nonstructural components as well as reinforced concrete structures. He studied the performance of floating offshore wind turbine at University at Buffalo. He is currently working at UCL on both experimental and numerical research activities aimed at assessing the behavior of structures when subjected to earthquake and tsunami excitations.

Seismic performance of nonstructural components

ABSTRACT

Several research studies on nonstructural components are nowadays conducted based on several motivations: (a) the threat to life-safety that the collapse of nonstructural components can cause; (b) the attitude of these components in exhibiting damage (and the consequent evacuation of buildings) even for low-intensity earthquakes; (c) the huge economic loss connected to their damage.
The research seminar deals with different experimental and numerical activities aiming at the evaluation of both the seismic capacity and the seismic demand of nonstructural components. The seismic capacity was evaluated by means of several experimental tests on different typologies of nonstructural components, i.e. innovative plasterboard partitions, hollow brick partitions, temporary partitions, standard high plasterboard partitions, hospital building contents. A test setup is defined for each test campaign in order to subject the specimen to the demand that it would experience in a building. Realistic boundary conditions of the specimen are reproduced. A testing protocol is defined according to AC 156 protocol, in case shake table tests are conducted, and FEMA 461 prescriptions, in case quasi-static tests are performed. After each test of each campaign the visual damage is correlated to the occurrence of a given Damage State (DS) through the use of a damage scheme. A relationship between an Engineering Demand Parameter (EDP), e.g. the interstorey drift ratio or the peak floor acceleration, and a predefined Damage State (DS), is established for the tested components. In case the number of specimens within a test campaign is adequate, the fragility curve of the tested specimens is also evaluated. The damage progression is correlated to different properties of the test setup, such as its natural frequency, damping ratio and the dissipated energy. Macro-models of the tested specimens are also defined based on the experimental results for an easy implementation in a structural model of the tested nonstructural components. Finally, the suitability of the FEM model approach to plasterboard partitions is also discussed.
The evaluation of the seismic demand on nonstructural components also assumes a key role in the seismic performance of these components. Nonstructural components should be subjected to a careful and rational seismic design, in order to reduce the economic loss and to avoid threats to the life safety. A parametric study on five RC frame structures, designed according to Eurocode 8, highlights that the Eurocode formulation for the evaluation of the seismic demand on nonstructural components does not well fit the outcomes of the analyses. The counterintuitive approach of current building codes to the design of nonstructural components is discussed and the seismic demand on acceleration-sensitive nonstructural components caused by frequent earthquakes is also investigated. Finally, a novel formulation for the demand on nonstructural component is proposed for a likely implementation in future building codes.