Terenzi Gloria et al., Trends in Green chem 2018, Volume 4
DOI: 10.21767/2471-9889-C2-011

Low-impact seismic retrofit technologies for school buildings

Terenzi Gloria[1], **Sorace Stefano**[2] and **Costoli Iacopo**[1]
[1]University of Florence, Italy
[2]University of Udine, Italy

Supplemental damping strategies are increasingly adopted for seismic retrofit of frame structures also in consideration of their low-impact architectural and environmental characteristics. A further spreading of these technologies in the professional community strongly depends on the availability of simple design procedures, especially concerning the preliminary sizing of the dissipaters. A viable design criterion was recently proposed by the author to this aim and applied to the retrofit study of a reinforced concrete gym buiding. A new case study, namely a school building in Florence dating back to the early 1980s, is examined in this paper, so as to evaluate the feasibility of the criterion for a more complex structure. The building is composed of two portions, with reinforced concrete and steel frame structure, respectively. Similarly to several other buildings of the same period, the structure is infilled by heavy reinforced concrete panels interacting with the frame elements under horizontal loads. A careful reconstruction of the structural characteristics of the constituting members, based on the original design documentation and on-site testing campaigns, highlighted specific drawbacks in current state, related to a remarkable degradation of the materials and a poor performance of several elements. The retrofit solution considered in this study consists in removing the infill panels and replacing them with a set of dissipative braces incorporating fluid viscous dampers as protective devices. The design is carried out by the sizing criterion mentioned above, targeting an elastic structural response up to the maximum considered earthquake normative level. A performance analysis carried out in retrofitted conditions confirms that the proposed sizing criterion helps optimizing the mechanical characteristics of the dampers by carrying out simple procedural design steps.

Figure: Frontal view of the school building analyzed

Recent Publications

1. Sorace S, Terenzi G and Licari M (2015) Traditional and viscous dissipative steel braced top addition strategies for a R/C building. International Journal of Structural Engineering, 6(4):332-353.
2. Sorace S, Terenzi G and Mori C (2016) Passive energy dissipation-based retrofit strategies for R/C frame water towers. Engineering Structures 106:385-398.
3. Sorace S, Terenzi G, Bitossi C and Mori E (2016) Mutual seismic assessment and isolation of different art objects. Soil Dynamics and Earthquake Engineering 85:91-102.
4. Sorace S and Terenzi G (2016) Analysis and seismic isolation of an older reinforced concrete vaulted building. Contemporary Engineering Sciences 9(25):1201-1215.

5. Sorace S and Terenzi G (2017) Existing prefab R/C industrial buildings: seismic assessment and supplemental damping-based retrofit. Soil Dynamics and Earthquake Engineering 94:193-203.

Biography

Terenzi Gloria has completed her Graduation in Civil Engineering at the University of Rome “La Sapienza”, in 1991. In 1996, she has completed her PhD in Structural Engineering at the University of Florence. From 2001 to 2015, she was a Researcher in Structural Engineering in the DICEA Department at the University of Florence. Since 2015, she is working as an Associate Professor of Structural Engineering in the same department, where she is currently teaching structural engineering, and earthquake engineering. Her main research fields concern earthquake engineering, structural dynamics, finite element modelling, and structural assessment. Two among her papers were jointly awarded in 2001 edition of the “Munro Prize". Another paper was awarded in 2002 “IABSE Outstanding Paper Award”, for the best paper published every year in *Structural Engineering International* journal.

gloria.terenzi@unifi.it

Notes: