Structural assessment of a modern heritage building

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a b s t r a c t

A structural assessment study on ‘‘Palazzo del Lavoro’’ in Turin, a masterpiece by Pier Luigi Nervi, was carried out within a National Research Project dedicated to the analysis of modern heritage architecture in Italy. Based on the original design documentation collected through records, a complete finite element model of the building was generated. The study included detailed models of the main structural members, represented by monumental reinforced concrete columns, a mushroom-type steel roof and reinforced concrete ribbed gallery slabs, and the main non-structural systems, constituted by continuous gallery-to-roof glazed façades. The results of the linear and non-linear analyses developed by these models, aimed at fully understanding the original design concept of the various members, as well as at evaluating their current static and seismic safety conditions, are reported in this paper. The non-linear computations include a buckling analysis of the slender steel beams constituting the roof, and an ‘‘integral’’ seismic pushover analysis of the monumental columns. The results of the analyses highlight safe conditions and good performance objectives in general, but for some important exceptions. Indeed, the roof beams failed to pass the verifications on global and local panel flexural–torsional buckling, and some cantilever beams of the gallery floors showed poor shear resistance. Retrofit hypotheses are also formulated for these elements, so as to help the entire structure to comply with the requirements of the new Italian Technical Standards.

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