

Seismic retrofitting of historical masonry heritage structures: A case study of an adobe masonry building in Lima, Peru

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ABSTRACT

The need for seismic retrofitting on a historical masonry heritage structure raises questions that go beyond the improvement of its seismic behaviour after the intervention. Indeed, principles as minimum intervention or reversibility must be considered before a consensus decision can be reached, especially when this process is just a part of a broader and deeper intervention on this kind of building.

Moreover, the complexity to perform in-situ experimental tests results in the uncertainty on the masonry mechanical properties, which are typically assumed as a homogeneous and isotropic material. All these uncertainties, among others, result in the difficulty to predict the different possible failure mechanisms of the complete structure and its structural behaviour.

Through the analysis of different possible seismic strengthening solutions for a 19th century historical masonry heritage building these issues are tackled. The selected case study is the fort of Santa Catalina, an adobe masonry load-bearing wall building located in Lima, Peru, on which it has been decided to carry out its seismic retrofitting among the complete rehabilitation of the building. The Peruvian coast is classified as a high seismic activity zone, where an 8.0 Mw is expected to occur according to recent studies performed by the Geophysical Institute of Peru.

In this context, this work presents the results of a preliminary characterization of the selected adobe masonry building and the subsequent numerical modelling structural assessment of the building's seismic performance, with and without strengthening, analysing its seismic vulnerability in order to define the fitting solution.

Thus, the ongoing research allows to define an effective seismic retrofit solution and respectful to the building's historic significance.