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Seismic vulnerability of historic masonry buildings: a case study in the center of Lucca

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Abstract

The Italian territory, as that of many other European countries, is currently defined as a total seismic territory. The cultural heritage is generally made of historic constructions of load-bearing masonry buildings, organized in complex aggregates. These structures, due to their intrinsic vulnerability and their reciprocal interactions, are particularly susceptible to local or global collapses in case of seismic loading.
This paper aims at analyzing the seismic vulnerability of the masonry aggregate of Civitali Insitut, located in the city center of Lucca (Italy). After a description of the complete knowledge process done, based also to partially destructive onsite tests of double flat-jacks, the static and seismic assessment of the complex has been discussed analyzing both local mechanisms and global behavior by assuming different structural configurations according to the level of connections between structural elements. Particular attention has been paid to the study of the vaults covering the ground floor. The analyses have highlighted some critical issues typical of that type of building structures such as the weak walls' connections and the poor quality of the masonry type.

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Keywords: masonry aggregate; statc and seismic assessment.

1. Introduction

The static and seismic assessment of ancient masonry buildings represents a significant topic for several European Countries, characterized by high seismic hazard and architectural heritages generally consisting of inadequate seismic resistant buildings. Historical constructions are largely made of load-bearing masonry structures organized

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