

# APPLICATION OF THE LiABlock\_3D SOFTWARE FOR THE SEISMIC VULNERABILITY ASSESSMENT OF THE CASTLE OF BUSSI (ITALY)

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## Abstract

This paper deals with a sophisticated approach for the seismic vulnerability assessment and the implementation of effective mitigation strategies to be applied to the meaningful case study of the castle of Bussi, in Italy.

The considered castle is part of the cultural heritage of Abruzzi and was seriously damaged by the 2009 L’Aquila earthquake, presenting those typical mechanisms that are usually observed for Italian masonry buildings.

In order to interpret the occurred damage, structural analyses were carried out using LiABlock\_3D [1], a novel software tool for the limit equilibrium analysis of masonry structures subjected to live loads and settlements [2], that provides, as outputs, the values of the collapse loads, plotting the corresponding collapse mechanism. In this software, masonry structures are modelled as an assemblage of three-dimensional rigid blocks interacting each another through no tension-friction point contact interfaces characterized by infinite compressive strength. The developed formulation implements the static problem of limit analysis and allows to take into account both associative and non-associative behavior.

The considered software allowed to detect the occurred in-plane and out of plane variable lateral loads, giving information about the most effective retrofitting interventions to be applied after the reparation of the castle. Moreover, the implemented analyses allowed to stress on the fragilities due to several recent interventions, such as the addition of a RC heavy slab.

**Keywords: LiABlock\_3D, Limit Equilibrium Analysis, No Tension-Friction Point Contact Interfaces, Masonry Structures, Cultural Heritage, Castles, Seismic Vulnerability Assessment, Retrofitting Interventions.**

## References

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