

THE ROLE OF THE KNOWLEDGE PROCESS IN THE SEISMIC ASSESSMENT OF MASONRY BUILDING AGGREGATES – AN ITALIAN CASE STUDY

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The recent seismic events occurred in Central Italy have rekindled the attention toward the safeguard of historical centers and led to a renovated debate within the academic community regarding some specific aspects of their seismic vulnerability and protection. The study of masonry building aggregates is certainly one of these aspects since they represent the main units composing the urban configuration of the Italian and, also European, historical towns [1-4].

Because of their constructive and evolutionary history, masonry aggregates are a complex assemblage composed of units with different periods and techniques of construction, materials and structural details, which, all, contribute to the seismic response of the whole. Therefore the vulnerability assessment of aggregates has to necessarily start from the process of knowledge able to provide the reliable input data for the development of the structural models [5-7]

The main goal of the paper is to present a procedure for the seismic assessment of masonry building aggregates with specific regards to the local mechanisms, which are the most frequent suffering collapse modes of masonry buildings [8-11]. The proposed procedure combines the level of data details deduced from the knowledge process to the level of refinement of the structural models and, then, to the type of output information, in a multi-level *input-analysis-output* approach. A first level is defined on the base of fast-track activities and/or acquisition of available database, which allow to provide qualitative information about the expected type of collapse mechanisms, throughout the use of simplified models. Differently, a second level is defined on the base of a as-built process of knowledge by using advanced instrumental surveys, which allow to provide quantitative information, such as the seismic acceleration activating the local mechanisms, throughout the use of more refined structural models.

The procedure is applied to the case study of Borgo San Rocco in Sora (FR), a municipality in Central Italy, near the Apennines, composed of two structural masonry aggregates developing like a “Street Canyon”. In particular, the first approach has been applied by using the available historical archive records, together with a visual survey and online interactive maps. The obtained data have been introduced into a simple numerical tool developed by the authors for carrying out information about the expected collapse mechanisms of the units composing the two aggregates.

Regarding the second approach, a survey phase based on both the digital aerial photogrammetric technique and detailed building surveys has been considered. In this case it has been possible to use numerical procedures based on the kinematic analysis for carrying out information about the seismic level of vulnerability of the structural units.

The obtained results are discussed in the paper by particularly emphasizing the importance of the connection between the phase of knowledge and that of structural analysis and, also, underlining the role, the advantages and the limitations of each level of the proposed procedure within the seismic assessment of masonry building aggregates. Furthermore, it is discussed the relevance of the available database, among these the one developing in the context of the project CARTIS (DPC/ReLUIS 2019-2021), which represent a valuable support to the proposed procedure.

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