The monitoring system of the Santa Maria di Collemaggio Basilica

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ABSTRACT

A complex monitoring system has been installed in the 13th century Santa Maria di Collemaggio basilica, L'Aquila Italy.

The basilica's vulnerabilities, exhibited during the 2009 earthquake of L'Aquila, highlighted the importance of local rather than global seismic response. Thus, for the sake of structural health monitoring and risk analysis, a number of different masonry macro-elements have been identified, among them the facade, the abse, the navies' walls, etc.

The repair works entailed an increase in the overall structure's response capacity, but despite the efforts the basilica, due to its peculiarities, still show significant vulnerability versus some local collapse mechanisms exhibited by enumerated macro-elements.

The recently installed monitoring system is capable of capturing the dynamic behaviour of the macro-elements and observing the relevant collapse mechanisms activation.

Each macroelement has been subjected to periodic analysis, in the current paper results from analysis performed over the basilica's façade are reported.

Results from Output-Only Identification, driven by ambient vibration, and from Input-Output Identificatoin, driven by seismic events, are reported; a damage detection algorithm has been tested against a meaningful structural modification. SS-Covariance Driven algorithms have been used for modal identification [1] and damage detection [2-3].

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