Vademecum for the seismic verification of existing buildings: application to some relevant buildings of the Trieste Province

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The procedure we developed and applied to a few relevant cases leads to the seismic verification of a building by a) use of a scenario-based non-deterministic approach (NDSHA) for the calculation of the seismic input and b) control of the numerical modeling of an existing building using free vibration measurements of the real structure.

The key point of this approach is the strict collaboration of the seismologist and the civil engineer: from the seismic input definition to the monitoring of the response of the building in the calculation phase. The vibrometry study allows the engineer to adjust the computational model in the direction suggested by the experimental result of a physical measurement.

The procedure has been applied to several relevant buildings of the Trieste Province.

NDSHA seismic elaborations

The seismological and morphostructural analyses then allow for the definition of the "scenario earthquake" i.e., of the strong earthquakes that may take place in the region of interest that are used to generate a database of accelerograms obtained by the realistic modeling of the ground motion, carried out using the physical-mathematical principles that are at the basis of the propagation and local amplification of the seismic waves, as suggested by the Italian regulations (§ 132.6 and § 132.16).

Engineering analysis

The phase of numerical modeling of the building is partly made in advance and is part accompanied by the survey of the geometry of the structural characteristics and of the materials that compose it.

In the correct modeling of existing buildings, it cannot be ignored by the traditional approach of numerical modeling, the careful vibrometric analysis of the building. The vibrometry study allows the engineer to adjust the computational model in the direction suggested by the experimental result of a physical measurement.

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Characterisation of the bedrock model for each cell

Definition of the seismic sources with the eventual inclusion of seismogenic nodes

Definition of the sources from the DISS database (NGV)

Definition of the geologic section and of the geotechnical parameterization.

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