



## **Scenario based seismic hazard assessment and its application to the seismic verification of relevant buildings**

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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 neodeterministic 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, from the seismic input definition to the monitoring of the response of the building in the calculation phase, of the seismologist and the civil engineer. The vibrometry study allows the engineer to adjust the computational model in the direction suggested by the experimental result of a physical measurement. Once the model has been calibrated by vibrometric analysis, one can select in the design spectrum the proper range of periods of interest for the structure. Then, the realistic values of spectral acceleration, which include the appropriate amplification obtained through the modeling of a “scenario” input to be applied to the final model, can be selected.

Generally, but not necessarily, the “scenario” spectra lead to higher accelerations than those deduced by taking the spectra from the national codes (i.e. NTC 2008, for Italy). The task of the verifier engineer is to act so that the solution of the verification is conservative and realistic.

We show some examples of the application of the procedure to some relevant (e.g. schools) buildings of the Trieste Province. The adoption of the scenario input has given in most of the cases an increase of critical elements that have to be taken into account in the design of reinforcements. However, the higher cost associated with the increase of elements to reinforce is reasonable, especially considering the important reduction of the risk level.