Session ID: SHM-4

Title
SHM TECHNIQUES FOR PROMPT DAMAGE ASSESSMENT OF CULTURAL HERITAGE TOWERS

Convenors
E. García-Macías [1], D.V. Oliveira [2], F. Ubertini [3]

Description
The structural health monitoring (SHM) of historic construction poses a formidable challenge due to their complex distribution of volumes and heterogeneity, uncertainties in materials and inner structure, historical series of damage with uncertain origin and extension, as well as potential structural pathologies that develop across dimensions from micro to the macro levels. Historic towers, which represent one of the most widespread typologies of heritage, are particularly susceptible to seismic events and natural degradation phenomena. To provide a comprehensive safety assessment of such structures, growing efforts have been devoted in recent years to develop integrated monitoring systems exploiting both local and global sensing technologies and data fusion. Furthermore, recent advances in the fields of Big Data analysis, Digital Twinning techniques, and Artificial Intelligence (AI) are enabling unprecedented possibilities to provide high-level quasi real-time damage identification, providing infrastructure managers and conservators with extraordinary tools to optimize rehabilitation protocols and the prioritization of emergency interventions in the aftermath of natural disasters such as earthquakes.

In this context, this Technical Session has the ambition of collecting the most recent advances in the development of data- and model-based SHM techniques for fast damage assessment of historical towers. Particularly framed in the context of seismic assessment, contributions addressing some of the following topics, but not limited to, are welcome:

- Physics-based AI and machine learning models for rapid damage assessment.
- Digital twinning techniques and model inverse calibration for damage identification.
- New data fusion approaches.
- Data mining and Statistical pattern recognition techniques.
- Data-based seismic risk assessment.
- Regional seismic assessment.
- Bayesian model inference.
- Life-cycle cost analysis.

Invited Speakers
P.B. Lourenço [4], M.G. Masciotta [5], C. Gentile [6], F. Clementi [7], S. Ivorra Chorro [8], G. Bartoli [9]

Affiliations
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