



## Convenors

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## Link:

<https://www.wcee2024.it/contributions/>

## Important dates

- 31 MAY 2023 - Closure of abstract submission and opening of paper submission and pre-registration.
- 30 SEPTEMBER 2023 - Closure of paper submission and pre-registration.

## TECHNICAL SESSION - CHH-3

# Digital twinning of cultural heritage structures in earthquake zones

**Description:** The most advanced step in the path of knowledge of a structure consists of the definition of a virtual model, or digital twin, as close as possible to the system under observation or monitoring, not only from a geometric and material point of view, but above all from a mechanical point of view. The model corroboration process not only allows the consistency of the different experimental information to be checked, reducing the uncertainties of virtualization, but above all creates a predictive tool for preservation. This is especially important in the case of seismic protection of architectural heritage buildings, where the principle of minimal intervention applies.

One of the main problems of the digital twinning is the conceptualization of virtual models that are able to reproduce quite accurately the behavior of the real twin (be it a mechanical or physical behavior) succeeding in this operation with a minimum computational effort.

To reach this milestone, a deep research for theories and models that explore behaviors that go beyond the classical continuum theory, or the use of its discretization (e.g., Finite Element (FE) method) is needed for cultural heritage and masonry structures, contemplating synergistic approaches to modeling (mechanical and non-mechanical) for example by resorting to multi-theories (e.g., Discrete Element (DE) method interconnected to FE method) or directly by resorting to experimental data that partially or wholly replace parts of the digital twin (e.g., grey-box approaches). The automation of the interconnection of data, theories and modeling approaches is still an open issue in digital twinning research and deserves an ad hoc discussion to exchange opinions and optimize the research effort towards the right path.

The session intends to stimulate a multi-disciplinary debate about harmonizing heterogeneous information. Contributions will include but are not limited to digital twinning of structures, FE model updating, hybrid simulations, FE model corroboration and verification, prediction of the seismic response, model driven SHM, multiphysics data integration, digital twinning of masonry structures, DE model corroboration and verification, Uncertainty Quantification, Data Fusion, Surrogate Modelling, etc.



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