

# Advances in Structural Health Monitoring for Masonry Structures

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Historical masonry structures, including churches, towers, and palaces, represent a significant part of Europe's cultural and monumental heritage. According to the empirical approaches typically employed at the time of their construction, these structures were primarily designed and built to resist gravity loads only, with limited resistance to horizontal actions, such as those induced by seismic events. As a result, historical masonry structures are highly vulnerable to earthquake-induced damage. Additionally, structural issues arising from the aging of building materials, differential foundation settlement, and the application of excessive live loads can further compromise their structural integrity. Poor maintenance can also accelerate the decline of their structural performance throughout their service life.

In this context, Structural Health Monitoring (SHM) approaches can aid in assessing potential deterioration of the structural integrity of masonry structures during operating conditions, allowing for early detection of damage initiation and progression. Maintenance and retrofitting interventions can also be planned based on the insights gained from ongoing SHM activities, with obvious benefits for both cultural heritage preservation and human safety.

This Special Session aims to gather the latest advances in research on SHM applications to historical masonry structures. Topics of interest include, yet are not limited to:

- Urban-scale SHM
- Machine learning approaches
- Damage detection
- Early warning
- Data-driven approaches
- Data-fusion
- Model-based methodologies
- Static and dynamic response parameters evaluation
- Modal analysis
- Novel sensing technologies
- Surrogate modeling
- Real-world SHM applications