

On The Numerical Modelling-Based Damage Diagnostics In Cultural Heritage Structures

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In order to optimally design monitoring systems in historic structures, the understanding of how crack patterns could have originated appears of primary importance. In this contribution, a numerical modelling-based damage diagnostics framework is presented for cultural heritage structures. Firstly, the numerical model is generated directly from the point cloud of the historic structure through an automatic point cloud-to-numerical procedure. Then, several nonlinear static and dynamic analyses are performed to account for different likely load scenarios on the historic structure, e.g. earthquakes, settlements, etc., identifying the most likely ones which led to damage. Accordingly, the identification of the most likely load scenario that led to damage is conducted through the comparison with existing damage patterns. The resulting model will practically reflect the current condition of the structure, allowing for the design and optimization of the monitoring system. The potentialities of the numerical modelling-based damage diagnostics framework herein presented are shown through a real case study application, i.e. the Morris Island Lighthouse in South Carolina (USA).