Editorial

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Biographical notes: Fulvio Parisi is an Associate Professor of Structural Engineering at University of Naples Federico II, Italy. He is an Associate Editor of three international journals and editorial board member of three international journals. In over 20 research projects, he focused on the assessment, retrofitting, robustness, vulnerability, and health monitoring of buildings and bridges. He authored over 150 papers in journals and conference proceedings, a book, and 12 book chapters, and edited two books and a journal special issue. Since 2020, he was included in the list of world's top 2% scientists according to the scientific impact of his research activity.

Nicola Tarque is a Full Professor at the Pontificia Universidad Católica del Perú and, since this year, an international researcher at the Universidad Politécnica de Madrid under the scheme 'María Zambrano'. He is also an expert member at Iscarsah (ICOMOS) and a member of the scientific committee of the Adobe Peruvian Code. In addition, he is part of the editorial board of two international journals. His main research interests include seismic vulnerability assessment of reinforced and unreinforced masonry buildings (adobe, stone, fired brick), evaluation of the seismic safety of historical constructions, finite element modelling, development of static and dynamic experimental tests.

Humberto Varum is a Full Professor and the Director of the PhD program at the Civil Engineering Department of the Faculty of Engineering of the University of Porto, in Portugal. Since May 2015, he is a member of the directorate body of the Construction Institute from the University of Porto, and the President since May 2019. He is an integrated member and Vice-coordinator of

CONSTRUCT Research Unit: Institute of R&D in Structures and Construction. His main research interests include: assessment, strengthening and repair of structures, earthquake engineering, historic constructions conservation and strengthening.

Since ancient times, earthen materials have been used to build a variety of constructions worldwide, resulting in a considerable number of UNESCO World Heritage Properties and historical sites to be preserved. In developing countries, traditional earthen construction techniques are still in use due to their low cost and local availability of materials. Also, interest in earthen constructions has grown significantly in developed countries for fabricating dwellings that meet modern societal demands regarding architectural compatibility, thermo-hygrometric comfort and environmental sustainability. However, despite their multiple advantages, earthen constructions are often non-engineered facilities with high vulnerability to several hazards and high levels of complexity due to, for instance, irregular geometry and construction deficiencies (particularly in case of historical constructions and informal urban settlements), huge variability of physical and mechanical properties, and fast deterioration.

The special issue on *Latest developments in digital technologies experimental testing and numerical simulation of earthen constructions* includes five original research papers that present novel methodologies, technologies and case studies related to computer-aided structural modelling, experimental material characterization and structural testing, numerical simulation, and retrofitting of earthen constructions. Two papers deal with rammed earth constructions, whereas the others focus on adobe masonry buildings.

Rodríguez-Mariscal et al. present a study on rammed earth constructions based on both non-destructive and destructive tests on prismatic and cylindrical specimens. In detail, non-destructive testing consisted of ultrasound pulse velocity tests, whereas destructive testing was based on compressive and tensile tests. The potential of high-energy static compaction to achieve dry density levels similar to those produced by dynamic compaction is discussed.

In the paper by Misseri and Rovero, different types of experimental tests for mechanical characterization of rammed earth are presented. Mechanical behaviour in compression, tension and bending was investigated. The main objective of the study was to demonstrate that a bi-modulus material model allows a more accurate prediction of longitudinal stresses in the three-point bending tests. To that aim, closed-form solutions are proposed for both Euler-Bernoulli and Timoshenko beam models, observing that the latter beam model is less conservative for prediction of the tensile Young's modulus of rammed earth.

Fenu et al. investigated the accuracy of the equivalent frame method for seismic performance assessment of adobe masonry buildings. Based on state-of-the-art macro-element modelling criteria, the authors simulated the non-linear behaviour of a half-scale adobe building specimen. Analysis results show a satisfactory numerical-experimental agreement, confirming the computational accuracy of non-linear macro-element models when dealing with adobe buildings.

Ferretti et al. numerically reconstructed the possible geometries of an adobe dome at the Round Hall building located in the archaeological site of Old Nisa, Turkmenistan. The work started with archaeological investigations and experimental tests. The data from on-site experimental tests were effectively used to calibrate the material model assigned to adobe masonry, which was based on the concrete damage plasticity criterion. Non-linear finite element models were developed for each assumed geometry, assessing the structural behaviour of the dome under gravity loads. All geometric configurations considered in the study were found to be stable with significant safety levels, substantiating the hypothesis on the actual presence of a dome.

Finally, the paper by Rafi et al. deals with the experimental evaluation of a retrofitted adobe model, which was subjected to shaking table testing under ground motion recorded during the 1995 Kobe earthquake. The seismic strengthening system consisted of bamboos and steel wired mesh placed vertically and horizontally around the adobe walls. Most of damage was observed on in-plane walls with openings, with only slight out-of-plane cracking. The strengthening system was able to produce a box-type response of the specimen, indicating an asymmetric behaviour of walls subjected to in-plane loading.

It is intended that the multidisciplinary content of this special issue will be of interest for students, researchers and most practitioners involved in the construction, surveying, performance assessment and conservation of earthen structures.

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