Preface

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Biographical note: Gabriele Milani is an Associate Professor at the Department of Architecture, Built Environment and Construction Engineering A.B.C., Technical University of Milan, Italy. He is a well-known expert of masonry modelling, being the second author for number of papers in Scopus under the keyword 'masonry'. He is also an expert of limit analysis, FEM, homogenisation theory, FRP reinforcement, genetic algorithms (GA), rubber vulcanisation and elastomeric seismic isolators. He has published more than 100 international journal papers (h-index 21), 7 chapters in books, coedited 1 book on DEM and he has more than 100 presentations at conferences. He received a K.J. Bathe Award (2014) by Computers & Structures (Elsevier), a Telford Premium Award (2012) by the UK Institution of Civil Engineers and a most Cited Author Award (2006–2010) by Computers & Structures (Elsevier).

I welcome with pleasure, on behalf of the Editorial Board and Inderscience Publishers, all the masonry community worldwide to the inaugural issue of *International Journal of Masonry Research and Innovation (IJMRI)*.

As clearly stated by the title, we deal with 'masonry', a building material that can be reasonably considered one of the oldest that still finds wide use in today's building practice.

Despite its use is well known from at least 10000 years and the intuitive technique to assemble bricks maintains essentially unaltered nowadays, important new developments in materials used, applications and reinforcement techniques have been recently - and for sure will be - proposed and deeply investigated.

As a matter of fact, one of the most important features making masonry appealing is the simplicity to lay stones or bricks on top of each other, either with or without cohesive mortar. Other intriguing issues involve aesthetic matters, the good durability, sound absorption and fire protection. Load bearing walls, infill panels, reinforced masonry and low-rise buildings are examples of constructions where the use of structural masonry is still competitive.

To deal with masonry is not an easy task, because it can be the result of either regular or random assemblages of bricks, blocks and stones of any shape (regular and irregular), and mortar with any kind of mechanical properties (cement, clay, gypsum, etc.). In some cases, even mortar is missing and blocks are assembled with dry joints.

From a mechanics point of view, there are essentially two ways of proceeding with masonry modelling: the first one is rather ambitious and aims at studying large classes of constructions, for instance old masonries. The second approach is a more pragmatic one and restricts to the mechanical description of very specific masonry types, e.g., structures constituted by regularly arranged blocks or brickworks of known geometry.

In such a complex context, IJMRI has mainly the mission of becoming the forum per excellence where experts in masonry modelling and experimentation all over the world can share their experiences, new finding on specific technical problems, as well as present new models where masonry is central.

Its specific aim is the publication and dissemination of original research papers devoted to the mechanics of masonry in general, technical applications in new works, repair practice and built heritage preservation. It therefore has the aim of providing a broad blend of scientific and technical papers, favouring exchange of ideas among theoreticians and practitioners active in different fields, including civil engineering, architecture, chemistry, cultural heritage and applied mathematics.

The emphasis is placed on contributions dealing with analytical, experimental and numerical investigations, which appear to be of permanent interest to research workers and engineers in the field of masonry research. The journal will include information on history, methodology, materials, survey, inspection, non-destructive testing, analysis, diagnosis, remedial measures and strengthening techniques.

The scope of the journal encompasses, but is not restricted to static and dynamic numerical modelling, dynamic identification, formulation and implementation of novel constitutive models both at micro-level, macro-level and homogenisation, laboratory and in situ characterisation, deterioration and long-term behaviour, structural health monitoring and so on.

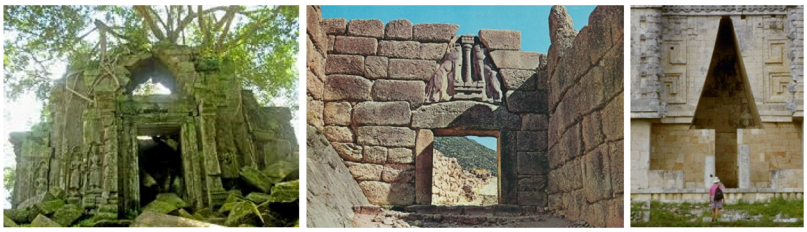
The inaugural issue of IJMRI consists of five papers. Articles in this issue of IJMRI have been selected after a meticulous technical peer review process. The papers accepted for the first issue of *IJMRI* cover hot topics in masonry modelling and experimentation ranging from theoretical research to practical and applied development on of the different examples. I hope you will enjoy reading them and get inspired to innovate further.

In the first paper, entitled “Nonlinear finite element modelling of high bond thin layer mortared concrete masonry”, Julian Ajith Thamboo and Manicka Dhanasekar discuss the final results of a finite element modelling approach for high bond strength thin layer mortared masonry, where units and mortar are modelled through a concrete damage plasticity approach and interfaces with traction separation damage principles. The finite element model is applied to wallettes subject to shear, flexure, compression and combined shear-compression. The numerical results are validated with experimental test results, finding good agreement. An interesting predicted biaxial failure envelope of the high bond strength thin layer mortared concrete masonry is presented in the end.

In the second paper, entitled “Experimental investigation for the friction evaluation in the masonry structures”, Renato Olivito, Mario Esposito and Nicola Totaro discuss theoretically and experimentally the role played by friction in dry joint masonry, providing in particular interesting hints into equilibrium - with reference to sliding - of two protruding semi-arches. Linked to such concept, the traditional approach of the false arch intuitively exploits frictional strength of dry joint stone blocks and was used successfully but without any quantitative knowledge of the mechanical masonry behaviour, in many different past cultures. Wonderful examples can be observed in

Angkor Wat, in the Citadel of Mycenae or in the Governor's Palace on the Mayan ruins site at Uxmal, Figure 1.

Figure 1 Admirable examples of false arches made from placing tiered, progressively projecting corbels on opposite walls in monumental architectures of the past. (a) Beng Mealea temple, Angkor Wat, Malaysia. (b) Lion Gate, citadel of Mycenae, Greece. (c) Uxmal Governor's Palace, Mexico. (see online version for colours)



(a) (b) (c)

In the third paper, entitled "An optimization procedure for material parameter identification for masonry constitutive models", Vasilis Sarhosis discusses the role played by parameters in constitutive models to realistically define material behaviour. It is a common practice to determine such material parameters from the results of different simple laboratory tests. Sometimes the effectiveness of determining material parameters that are representative of masonry behaviour from small-scale experiments has found to be problematic. The paper investigates the material parameter identification problem for masonry constitutive models, proposing an inverse analysis containing an optimisation procedure and surrogate modelling.

In the fourth paper, entitled "Finite element thrust line analysis of axisymmetric masonry dome", Mahesh N. Varma and Siddhartha Ghosh propose a novel analysis method for axisymmetric masonry domes, combining the simplicity of the thrust line with the versatility of the finite element approach. A modified axisymmetric element incorporates the hoop tension effects, allowing to obtain the thrust line of an axisymmetric masonry dome more accurately than the existing graphical approaches. A benchmark on a hemispherical axisymmetric dome shows the effectiveness of the proposed method, confirming the notions of classical thrust line analysis and postulates on the minimum thickness of a stable dome.

In the last paper, entitled "Numerical model upgrading of a historical masonry palace monitored with a wireless sensor network", Alessio Pierdicca, Francesco Clementi, Daniela Isidori, Enrico Concettoni, Cristina Cristalli and Stefano Lenci discuss the importance of structural health monitoring (SHM) with wireless sensor networks (WSN) as a powerful tool to quantify and reduce uncertainties regarding the structural performance of buildings. A WSN is usually a flexible solution with minor costs associated, especially if the network is composed by cheap devices (e.g., MEMS sensors). The work details the main results obtained in the context of the Palazzo Comunale of Castelfidardo monitoring project with WSN, with the aim to get an accurate numerical model that simulates the dynamic behaviour of the whole structure. An iterative approach to perform the tuning of the numerical model is proposed.

I am sincerely indebted to all those people who spent their time and contributed with their ideas to define the scope and vision of this publication. Thanks are due first to the strong support offered by all members of the international and distinguished Editorial

Board with extensive academic qualifications, in getting this journal up and running. I am very thankful to all the reviewers who supported the journal with their valuable comments and suggestions. I would like to thank all masonry researchers who accepted the challenge to submit their scientific work for the inaugural issue. I express my sincere thanks to the Inderscience Publishers who provided me the opportunity to edit an international journal with such a reputed publisher.

I will do my best to establish IJMRI as the premier forum for masonry research and innovation, as it deserves. High-quality submissions and special issue proposals devoted to emerging topics in masonry modelling and experimentation are definitely very welcome. Your feedback and comments on further improving IJMRI will be highly appreciated.