Editorial

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The *Open Construction & Building Technology Journal* is presently publishing a Special Issue on *Infilled Framed Structures* focusing on the *Experimental & Modelling Aspects*. It has been established that masonry infill walls affect the strength, stiffness and ductility of infilled frame structures. However, when designing such structures, it has become common practice not to include the existing infill walls in the structural analysis model as these elements are considered to be essentially non-load bearing. In doing so, the stiffness and strength contribution of the latter elements as well as their interaction with the members of the surrounding frame are ignored. Based on the available, published, experimental and numerical data, it becomes clear that the infill walls have a significant effect on the overall structural performance of the frames. Moreover, based on the above data it has been established that the infill walls usually act as diagonal compression 'struts' in the plane of the frame, resulting in an increase of the overall stiffness of the structure and in a reduction of its natural period, which in turn affects the distribution and intensity of the inertia loads generated during seismic excitation, as well as the distribution of the internal actions developing within the structural elements. Although the introduction of infill walls usually results in an overall increase of the seismic capacity and stiffness of the in-filled frame, it may also cause the development of stress concentrations in certain regions of the structure (e.g. the end regions of elements) leading to localized cracking or even unexpected forms of failure, which may potentially have a detrimental effect on the overall response of the frame.

Over the last three decades a large number of experimental investigations have been carried out in an attempt to quantify the effect of infill walls and panels on the structural response of frame structures. During these investigations, scaled models of one, two and even three storey bare (with no infill walls) or in-filled frames were tested**.** These specimens were subjected to monotonic or cyclic static loading or seismic excitation through shake table testing. The experimental information obtained (concerning deformation profiles, crack patterns, displacements, acceleration and base shear time histories, modes of failure etc) reveal that the introduction of infill walls into frames results -in general- in an overall increase in seismic capacity and stiffness. However, one needs to exercise caution when dealing with frames with brittle material (i.e. concrete), with irregular shapes or with openings in the infill walls, since the development of stress concentrations in certain regions of the structure (e.g. around existing openings of the infill walls, in the joint area, etc) may lead to the formation of localized cracking or even unexpected modes of brittle failure of the structural elements (beams of columns) of the frame.

I am very glad to announce, that, in this Special Issue, we expand the research frontier in the subject area by presenting 20 leading research articles [1-20], which have been authored (and co-authored) by 45 researchers from 9 countries (namely, Cyprus, Greece, India, Iran, Italy, The Netherlands, Turkey, UK, and USA). The articles present analytical (numerical) and experimental information on the response of infilled frames constructed from reinforced concrete, steel, and timber in an attempt to explain the significant scatter characterising the available test data and to assess the effect on certain parameters on structural performance associated with:

- the properties of the brittle materials used for the construction of infilled frames (i.e. concrete and masonry); it is worth noticing that the mechanical characteristics of masonry material depict a large scatter on their values,
- the intense anisotropic nature of masonry material; masonry exhibits distinct directional properties, due to the influence of mortar joints acting as planes of weakness [21-22]. Depending upon the orientation of the joints to the stress directions, failure can occur in the joints only, or, simultaneously in the joints and blocks.
- the conditions at the interfaces between the infill walls and the surrounding frame,
- the structural element geometry and reinforcement details,
- the stiffness and strength of the bare frame relative to that of the infill wall,
- the size and location of openings within the infill wall; it has been established analytically and experimentally that the size and location of gaps or openings within the infill wall can significantly effect the contribution of the latter element to the overall response of the frame [3, 23-27],
- the type of loading applied; the contribution of the infill wall to the lateral stiffness of frame is significantly reduced when the structure is subjected to reversed cyclic action, as is the case for seismic loading , during which the frame structure undergoes a large number of nonlinear cycles. Relevant experimental findings reveal a considerable reduction of the contribution of the infill wall on the response of infilled frames under seismic loading. This is owed to the rapid degradation of the stiffness and

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strength and the low energy dissipation capacity, due to the brittle nature of masonry and the damage (cracking) sustained by the masonry infill walls.

Concluding, I would like to express my sincere acknowledgement to Prof. Christis Z. Chrysostomou, a distinguished academic leader at Cyprus University of Technology, for his acceptance to prepare the *Foreword* for this Special Issue. It is worth mentioning that Prof. Chrysostomou proposed back in 1991, in a pioneering way, a multiple-strut model for the infill wall [28, 29]. In closing, on behalf of the Journal, I would like to express our sincere thanks to all the authors of the papers as well as the reviewers for their systematic and innovative work.

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