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Vulnerability Reduction of Existing Buildings and Design of New Structures in Seismic Area

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PREFACE

This preface introduces the collection of papers belonging to the Mini-Symposium (MS) entitled "Vulnerability Reduction of Existing Buildings and Design of New Structures in Seismic Area", organized in occasion of the last ICNAAM 2016 congress held in Rhodes, Greece, 19-25 September 2016. The present MS is in its first edition and is conceived to follow and generalize the successful twin meetings on masonry organized in occasion of the last few editions of the ICCMSE congress, usually taking place with similar modalities the first part of the year. The main target is to exchange ideas, disseminate works in progress and recent results obtained by means of the most up-to-date numerical, analytical and experimental techniques on two difficult related topics, namely the seismic vulnerability reduction of existing buildings and the design of new structures in earthquake prone areas. It is an excellent occasion for the participants to meet, submit position papers and original contributions where the subject is the design and the analysis of structures in high seismicity regions, giving at the same time the opportunity to establish new collaborations among groups having complementary experiences, as well as to share the results obtained from cutting edge research on specific topics.

Experience of past earthquakes has demonstrated that many common buildings and typical methods of construction usually lack basic resistance against earthquake actions. Open challenges to tackle a consistent seismic design are more profoundly faced by developing countries, were the inadequacy and poor access to advanced technologies, resources and knowledge lead to build new structures still vulnerable for horizontal loads. Conversely, open issues in industrialized countries like USA, EU and Japan are still the mitigation of the seismic vulnerability of the existing/historical built stock, almost always constituted by non-ductile materials and conceived to withstand only vertical loads. The mini-symposium collects original works dealing with numerical, experimental and analytical approaches of single structural elements and entire structures. Particular emphasis is given to the structural safety assessment against earthquakes and on combined experimental and numerical structural analyses of masonry reinforced with carbon fibers. Technical considerations, particularly suitable for practitioners and critical comparisons with design recommendations are also included, basing on case studies.

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The first contribution by Bergamo et al. [1] is a seismic performance evaluation of a historical concrete deck arch bridge by means of in situ tests, dynamic identification and pushover analysis. Bertolesi and Milani in [2] and [3] present a Homogenized Rigid Body and Spring-Mass (HRBSM) model for the pushover analysis of FRP reinforced walls out-of-plane loaded and the non-linear dynamic analysis of entire buildings, respectively.

Capozucca and co-workers in [4] investigate the bond of CFRP strips in the strengthening of brickwork masonry. Clementi et al. in [5] present a comparison between global analyses done on historical masonry buildings using either equivalent frames or 3D solid models.

Formisano and co-workers in [6] and [7] have a numerical insight into the behavior of masonry historical aggregates under seismic loads.

Habieb et al. in [8] present a numerical investigation on residential masonry buildings isolated with low cost rubber seismic isolators.

Laterza et al. in [9] investigate the seismic performance of a multi-span existing masonry arch bridge.

Maracchini et al. in [10] show a preliminary study of the influence of different modelling choices and materials properties uncertainties on the seismic assessment of an existing RC school building.

Milani and Bertolesi in [11] and [12] present a holonomic homogenization model for the non-linear analysis on in-plane loaded masonry walls.

Paper [13] deals with the seismic performance assessment of three masonry churches through FE simulations, whereas paper [14] is devoted to the experimental and numerical analysis of three-leaf masonry specimens strengthened with basalt fibers.

Quagliarini et al. in [15] give useful hints on how to simulate pedestrian behaviors in seismic evacuation for vulnerability reduction of existing buildings.

Scalbi and co-workers in [16] discuss about the seismic assessment of existing precast concrete buildings, focusing in particular on the influence of deformable connections.

Valente and Milani in [17] analyze an under-designed RC frame, discussing both the seismic assessment through a displacement based approach and a possible refurbishment with FRP strips and RC jacketing.

Finally paper [18] is devoted to the numerical evaluation of the seismic response of historical masonry bell towers located in South-East Lombardy, Italy.

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Gabriele Milani was born in Cittadella-PD (Italy) in 1977. PhD in Civil and Industrial Engineering, MSc in Civil Engineering, both at the University of Ferrara, Italy.
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Antonio Formisano was born in Naples in 1977, June 23rd. In July 2003 he graduated cum laude in Building Engineering at the University of Naples 'Federico II', where in 2007 he gained his PhD in Construction Engineering. In the same year he became Assistant Professor of Structural Engineering at the Department of Structures for Engineering and Architecture of the aforementioned faculty. Actually, he is Aggregate Professor of Structural Design at the School of Polytechnic and Basic Sciences of Naples. From 2017 he received habilitation as Associate Professor. Teacher within International Masters “Design of Steel”, “Emerging Technologies for Construction” and “Sustainable Constructions under Natural Hazards and Catastrophic Events”. He was involved in several national and international research projects. He is editorial board member and reviewer of numerous international journals and conferences. He was lecturer in several national and international Universities, as well as Chairman and Organizer of Mini-Symposium and Special Sessions of many Conferences. He is member of the Eurocode 9 Committees SC 9. T1 Aluminium “Update and Simplification of all parts of EN” and SC 9. T2 Aluminium “New types of Connection”. He is author of more than

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Francesco Clementi was born in San Severino Marche (Italy) in 1981. He obtains MSc in Civil Engineering (2005), and the PhD Degree in "Architecture, Buildings and Structures" (2009) both at Polytechnic University of Marche. He is Assistant Professor (tenure-track) in "Structural Mechanics" at the Faculty of Engineering of Polytechnic University of Marche since 2012. He has developed research and teaching activities at the Universities of Ancona, Camerino, Lublin and Sao Paulo. He is member of the American Society of Mechanical Engineering (ASME) Technical Committee on "Dynamic and Control of Systems and Structures (DCSS)" since 2015. He was participant in several national and international projects (FP6, FP7, PRIN, Pompei Project, etc.). He is author of more than 80 scientific papers, published on national and international journals and conference proceedings.
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