

***Andrea Penna, PhD***

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***SHORT CURRICULUM VITAE***

Andrea Penna, Structural Civil Engineer at University of Genoa, in 2002 obtained a Ph.D. in Seismic Engineering from the Politecnico of Milan. After a post-doctoral fellowship in Structural Engineering at the Department of Structural and Geotechnical Engineering of the University of Genoa, he has been Researcher at the European Centre for Training and Research in Earthquake Engineering, Pavia (2003-2011). From December 2011 to September 2015 he has been Assistant Professor of Structural Engineering at the University of Pavia. Since October 2015 he is Associate Professor of Structural Engineering at the Department of Civil Engineering and Architecture of the University of Pavia, where he is teaching the courses of “Structural Engineering” and “Design of Structures”.

His research activity was initially mainly addressed to numerical modelling of masonry structures, seismic response evaluation of existing buildings, seismic risk analysis and seismic vulnerability of churches, historical buildings and historic centres.

As a researcher of the EUCENTRE Foundation, Andrea Penna continued working on seismic vulnerability of existing masonry buildings and numerical nonlinear modelling of seismic structural response. At the EUCENTRE he also carried out research activities characterized by significant experimental campaigns on the in-plane and out-of-plane response of masonry infill walls in r.c. frame structures, in-plane cyclic response of full scale masonry piers and mechanical characterization tests. He coordinated several research programs characterized by shaking table testing full-scale or reduced scale masonry buildings, also testing the effectiveness of different strengthening solutions.

He has been involved in many research projects, focused on seismic vulnerability and risk of existing masonry structures and heritage buildings as well as on the assessment of the seismic performance of innovative masonry technologies for both structural and non-structural applications. He served as principal investigator (PI) and co-PI of a number of research projects funded by public and private bodies in Italy and abroad.

He is author and co-author of more than 150 scientific publications and computer programs, mainly dedicated to the simulation of the seismic response of structures. He also contributed to several non-specialized magazines with articles on seismic risk and mitigation strategies. He also serves as a reviewer for a number of scientific journals. He was invited or keynote speaker in several international conferences.

Since 2011, Andrea Penna has been a member of the Teaching Body of the Ph.D. Programme in Computational Mechanics and Advanced Materials of the IUSS of Pavia, in collaboration with the University of Pavia. Since 2014 he is member of the Teaching Body of the Ph.D. Programme in Civil Engineering and Architecture and since 2017 of the new Ph.D. Programme in Design, Modelling and Simulation in Engineering at the University of Pavia. He has been member of several Ph.D. awarding juries in Italy and other European countries.

Andrea Penna participated to several of post-earthquake survey activities in Italy and other world countries (Pakistan, Chile).

## Recent publications

### *Articles in international journals*

- Graziotti F., Tomassetti U., Kallioras S., Penna A., Magenes G. (2017). Shaking table test on a full scale URM cavity wall building, *BULLETIN OF EARTHQUAKE ENGINEERING* (in press).
- Vanin F., Zaganelli D., Penna A., Beyer K. (2017). Estimates for the stiffness, strength and drift capacity of stone masonry walls based on 123 quasi-static cyclic tests reported in the literature, *BULLETIN OF EARTHQUAKE ENGINEERING* (in press).
- Guerrini, G., Graziotti, F., Penna, A., Magenes, G. (2017). Improved evaluation of inelastic displacement demands for short-period masonry structures, *EARTHQUAKE ENGINEERING AND STRUCTURAL DYNAMICS*, 46 (9), pp. 1411-1430.
- Kouris, L.A.S., Penna, A., Magenes, G. (2017). Seismic damage diagnosis of a masonry building using short-term damping measurements, (2017) *JOURNAL OF SOUND AND VIBRATION*, 394, pp. 366-391.
- Mendes, N., Costa, A.A., Lourenço, P.B., Bento, R., Beyer, K., de Felice, G., Gams, M., Griffith, M.C., Ingham, J.M., Lagomarsino, S., Lemos, J.V., Liberatore, D., Modena, C., Oliveira, D.V., Penna, A., Sorrentino, L. (2017). Methods and Approaches for Blind Test Predictions of Out-of-Plane Behavior of Masonry Walls: A Numerical Comparative Study, *INTERNATIONAL JOURNAL OF ARCHITECTURAL HERITAGE*, 11 (1), pp. 59-71.
- Graziotti, F., Tomassetti, U., Penna, A., Magenes, G. (2016) Out-of-plane shaking table tests on URM single leaf and cavity walls, *ENGINEERING STRUCTURES*, 125, pp. 455-470.
- Penna A., Senaldi I., Galasco A., Magenes G. (2016). Numerical simulation of shaking table tests on full-scale stone masonry buildings, *INTERNATIONAL JOURNAL OF ARCHITECTURAL HERITAGE*, 10 (2-3): 146-163.
- Bracchi S., Rota M., Penna A., Magenes G. (2016) Seismic assessment of masonry buildings accounting for limited knowledge on materials by Bayesian updating, *BULLETIN OF EARTHQUAKE ENGINEERING*, 14 (8), pp. 2273-2297.
- Graziotti F., Penna A., Magenes G. (2016) A nonlinear SDOF model for the simplified evaluation of the displacement demand of low-rise URM buildings, *BULLETIN OF EARTHQUAKE ENGINEERING*, 14 (6), pp. 1589-1612.
- Rosti A., Penna A., Rota M., Magenes G. (2016) In-plane cyclic response of low-density AAC URM walls, *MATERIALS AND STRUCTURES*, 49 (11), pp. 4785-4798.
- Costa, A.A., Penna, A., Arêde, A., Costa, A. (2015). Simulation of masonry out-of-plane failure modes by multi-body dynamics, *EARTHQUAKE ENGINEERING & STRUCTURAL DYNAMICS*, 44(14): 2529-2549.
- Bracchi S., Rota M., Penna A., Magenes G. (2015), "Consideration of modelling uncertainties in the seismic assessment of masonry buildings by equivalent-frame approach", *BULLETIN OF EARTHQUAKE ENGINEERING*, 13(11): doi:10.1007/s10518-015-9760-z.
- Penna, A., Mandirola, M., Rota, M., & Magenes, G. (2015). Experimental assessment of the in-plane lateral capacity of autoclaved aerated concrete (AAC) masonry walls with flat-truss bed-joint reinforcement. *CONSTRUCTION AND BUILDING MATERIALS*, 82, 155-166.
- Penna, A. (2015). Seismic assessment of existing and strengthened stone-masonry buildings: critical issues and possible strategies. *BULLETIN OF EARTHQUAKE ENGINEERING*, 13(4), 1051-1071.
- Penna, A., Magenes, G., Rota, M., Mandirola, M. and Rosti, A. (2015), Experimental-numerical research on the seismic performance of URM buildings made of lightweight AAC blocks / Experimentell-numerische Untersuchung zum seismischen Verhalten von unbewehrten Mauerwerksgebäuden aus Porenbetonblöcken. *MAUERWERK*, 19: 130–143.
- Penna A., Morandi P., Rota M., Manzini C.F., da Porto F., Magenes G. (2014). Performance of masonry buildings during the Emilia 2012 earthquake, *BULLETIN OF EARTHQUAKE ENGINEERING*. 12(5): 2255-2273.
- Mouyiannou A., Rota M., Penna A., Magenes G. (2014). Implications of cumulated seismic damage on the seismic performance of unreinforced masonry buildings, *BULLETIN OF THE NEW ZEALAND SOCIETY FOR EARTHQUAKE ENGINEERING*. 47(2): 157-170.
- Senaldi I., Magenes G., Penna A., Galasco A., Rota M. (2014). The Effect of Stiffened Floor and Roof Diaphragms on the Experimental Seismic Response of a Full-Scale Unreinforced Stone Masonry Building, *JOURNAL OF EARTHQUAKE ENGINEERING*. 18(3): 407-443.

- Rota M., Penna A., Magenes G. (2014). A framework for the seismic assessment of existing masonry buildings accounting for different sources of uncertainty, *EARTHQUAKE ENGINEERING & STRUCTURAL DYNAMICS*. 43(7): 1045-1066.
- Mouyiannou A., Rota M., Penna A., Magenes G. (2014). Identification of suitable limit states from nonlinear dynamic analyses of masonry structures, *JOURNAL OF EARTHQUAKE ENGINEERING*. 18(2): 231-263.
- Magenes G., Penna A., Senaldi I., Galasco A., Rota M. (2014). Shaking table test of a strengthened full-scale stone masonry building with flexible diaphragms, *INTERNATIONAL JOURNAL OF ARCHITECTURAL HERITAGE*. 8(3): 349-375.
- Penna A., Lagomarsino S., Galasco A. (2014). A nonlinear macroelement model for the seismic analysis of masonry buildings, *EARTHQUAKE ENGINEERING & STRUCTURAL DYNAMICS*. 43(2): 159-179.
- Araújo A.S., Oliveira D.V., Lourenço P.B., Magenes G., Penna A. (2014). In-Plane Shear Behaviour of Stone Masonry Piers: A Numerical Study, *Proceedings of the Twelfth International Conference on Computational Structures Technology, CIVIL-COMP PROCEEDINGS*, 106.
- Costa A.A., Arede A., Campos Costa A., Penna A., Costa A. (2013). Out-of-plane behaviour of a full scale stone masonry façade. Part 1: specimen and ground motion selection, *EARTHQUAKE ENGINEERING & STRUCTURAL DYNAMICS*. 42(14): 2081-2095.
- Costa A.A., Arede A., Campos Costa A., Penna A., Costa A. (2013). Out-of-plane behaviour of a full scale stone masonry façade. Part 2: shaking table tests, *EARTHQUAKE ENGINEERING & STRUCTURAL DYNAMICS*. 42(14): 2097-2111.
- Costa A.A., Arede A., Penna A., Costa A. (2013). Free rocking response of a regular stone masonry wall with equivalent block approach: Experimental and analytical evaluation, *EARTHQUAKE ENGINEERING & STRUCTURAL DYNAMICS*. 42(15): 2297-2319.
- Lagomarsino S., Penna A., Galasco A., Cattari S. (2013). TREMURI Program: An equivalent frame model for the nonlinear seismic analysis of masonry buildings, *ENGINEERING STRUCTURES*. 56(11): 1787-1799.
- Tondelli M., Rota M., Penna A., Magenes G. (2012). Evaluation of Uncertainties in the Seismic Assessment of Existing Masonry Buildings, *JOURNAL OF EARTHQUAKE ENGINEERING*. 16(Suppl. 1): 36-64.
- Rota M., Zuccolo E., Taverna L., Corigliano M., Lai C.G., Penna A. (2012). Mesozonation of the Italian territory for the definition of real spectrum-compatible accelerograms, *BULLETIN OF EARTHQUAKE ENGINEERING*. 10(5): 1357-1375.
- Palmieri M., Magenes G., Lai C.G., Penna A., Bozzoni F., Rota M., Macchi G., Auricchio F., Mangriotis M.D., Menon A., Meher P., Murty C.V.R. (2012). Reduction of seismic risk of Roman and Hindu temples, *Proc. 8th International Conference of Structural Analysis of Historical Constructions, WIADOMOŚCI KONSERWATORSKIE*, 2: 1674-1681, DWE. Wrocław, Polonia.

### ***Book chapters***

- DeJong, M., Penna, A. (2016) "Design of Masonry Structures," in A.Y. Elghazouli (ed.) *Seismic Design Of Buildings To Eurocode 8*, pp. 235-254, CRC Press.
- Penna, A., Rota, M., Galasco, A., & Mouyiannou, A. (2015). "Towards the Use of Time-History Analysis for the Seismic Assessment of Masonry Structures." In *Seismic Assessment, Behavior and Retrofit of Heritage Buildings and Monuments* (pp. 83-111). Springer International Publishing.
- Penna A., Magenes G. (2012). "Masonry Buildings," in Decanini et al. (ed.) *Report on the Maule (Chile) February 27th, 2010 earthquake*. IUSS Press, Pavia.
- Penna A. (2011). "Tools and strategies for the performance-based seismic assessment of masonry buildings" in M. Dolšek (ed.) "Protection of built environment against earthquakes", Springer (Dodrecht, Heidelberg, London, New York).