

Guido Andreotti

Curriculum Vitae

SHORT BIO

He obtained a BSc in Natural Sciences, then a BSc and MSc in Civil Engineering, graduating with honours. He worked in an engineering company before getting a PhD in earthquake engineering. He was a visiting student at the University of California Berkeley (USA) and a visiting researcher at the University of Canterbury (New Zealand). The main research field is geotechnical earthquake engineering, mainly focusing on site effects and ground response analysis, soil-structure interaction, soil liquefaction, seismic risk and damage assessment of geotechnical structures. He also gained experience in post-seismic reconstruction of foundation systems and rainfall-induced landslides.

CURRENT POSITION

Assistant Professor in Geotechnical Engineering email: guido.andreotti@iusspavia.it
University School for Advanced Studies IUSS Pavia. Piazza della Vittoria, n.15 27100, Pavia – Italy

	<i>Scopus</i>	<i>Google Scholar</i>
<i>h</i> -index	10	12
Citations	333	480

EDUCATIONAL HISTORY

- 2018 - **PhD in Earthquake Engineering.** IUSS Pavia, Italy.
- 2013 - **Master's Degree in Civil Engineering.** University of Pavia, Italy.
- 2010 - **Bachelor's Degree in Civil Engineering.** University of Pavia, Italy.
- 2003 - **Bachelor's Degree in Natural Sciences,** University of Pavia, Italy.

INTERNATIONAL RESEARCH EXPERIENCE

- 2018 - **University of Canterbury, Christchurch, New Zealand.** Subject: Constitutive models and numerical modelling of soil liquefaction. Referent: Prof. Misko Cubrinovski
- 2016 - **University of California, Berkeley, U.S.A.** Subject: Damage model for underground segmented tunnels under cyclic loading. Referent: Prof. Kenichi Soga

ACADEMIC TITLES AND APPOINTMENTS

- 2024-2025 **Burges Endowed Visiting Professorship program at the University of Washington (USA).** Appointment as a Burges Visiting Professor at the University of Washington (UW) Civil & Environmental Engineering (CEE) Department.
- 2023-2024 **Contract professor in Geotechnical Engineering.** University of Pavia, Italy. Department of Civil Engineering and Architecture.
- 2023 **Abilitazione Scientifica Nazionale (ASN)** to the function of associate professor in Geotechnical Engineering. Sector 08/B1-ICAR/07.
- 2022-2023 **Contract professor in Geotechnical Engineering.** University of Pavia, Italy. Department of Civil Engineering and Architecture.
- 2019-2020 **Contract professor in Geotechnical Engineering.** University of Pavia, Italy. Department of Civil Engineering and Architecture.
- 2018-2019 **Contract professor in Geotechnical Engineering.** University of Pavia, Italy. Department of Civil Engineering and Architecture.

TEACHING ACTIVITY

- 2023-2024 **Foundation Engineering and Earth Retaining Structures.** MSc course in Civil Engineering for Mitigation of Risk from Natural Hazards. University of Pavia and IUSS Pavia, Italy.
- 2023-2024 **Geotechnical Engineering.** Course in Building Engineering and Architecture, University of Pavia, Italy.
- 2022-2023 **Geotechnical Engineering.** Course in Building Engineering and Architecture, University of Pavia, Italy.
- 2021-2022 **Seismic ground response analysis.** PhD course. University of Pavia, Italy.
- 2019-2020 **Geotechnical Engineering.** Double Degree course in Building Engineering and Architecture, University of Pavia and Tongji University of Shanghai.
- 2018-2019 **Geotechnical Engineering.** Double Degree course in Building Engineering and Architecture, University of Pavia and Tongji University of Shanghai.
- 2019-2024 **Mathematics, Physics and Earthquakes.** Seminars IUSS Pavia, Italy.
- 2016 **Seismic design of foundations.** Professional Course. EUCENTRE Foundation. Pavia, Italy.
- 2019-2024 **Tutor** of n=2 PhD students and n=6 undergraduate students. IUSS Pavia and University of Pavia, Italy.

ACTIVITIES IN MAIN RESEARCH PROJECTS

- 2023-2024 **Innovative approaches for the seismic assessment of hydroelectric power plants, with particular reference to underground structures of large dams.** Project: Programma Operativo Nazionale (PON) “Ricerca e Innovazione”. IUSS Pavia, Italy.
- 2023 **Seismic design of retaining structures and foundation systems for the post-earthquake reconstruction of Arquata del Tronto in Italy.** USR Marche and EUCENTRE Foundation, Italy.
- 2022 **Assessment of the seismic vulnerability of shallow tunnels with soil-structure interaction effects.** EUCENTRE Foundation, Italy.
- 2022-2024 **Ground response analysis and advanced constitutive modelling of soil liquefaction.** Project: ReLUIS-DPC. Linea Geotecnica. University of Pavia, Italy.
- 2019-2022 **Definition of seismic demand through innovative approaches.** Project: Dipartimenti d’Eccellenza IUSS Pavia, Italy.
- 2018-2021 **Numerical modelling of rainfall-induced landslides.** Projects: ANDROMEDA. A new integrated hydrogeological model to assess landslides and flood-prone areas in Oltrepò Pavese, Italy. University of Pavia, Italy.
- 2022-2023 **The role of cracking in the relationship between natural frequencies and prestress level in the structural elements of bridges and tunnels, with implications on shear strength.** Project: CSLLPP and ReLUIS. IUSS Pavia.
- 2016-2019 **Advanced constitutive modelling of soil liquefaction.** Project: LIQUEFACT - Assessment and mitigation of liquefaction potential across Europe: a holistic approach to protect structures/infrastructures for improved resilience to earthquake-induced liquefaction disasters. University of Pavia, Italy.
- 2013-2016 **Damage-dependent fragility curves for tunnels.** Project: REAKT - Strategies and tools for Real Time EArthquake RiSk ReducTion. University of Pavia, Italy.

AWARDS AND AFFILIATIONS

- 2018 **Award: Key Scientific Article.** Advances in Engineering (AIE). Ontario, Canada. “*Detailed micro-modelling of the direct shear tests of brick masonry specimens: the role of dilatancy*”.
- 2013-2024 **EUCENTRE Foundation.** European Centre for Training and Research in Earthquake Engineering. Pavia (Italy)
- 2021 **Member of GEER - Geotechnical Extreme Events Reconnaissance (GEER),** supported by the National Science Foundation (NSF).

MAIN CONFERENCES AND WORKSHOPS

- 2024 Workshop on soil liquefaction. University of Naples Federico II. 25-26 January 2024, Naples, Italy. Oral presentation: **Advanced numerical modelling of ground response and port harbour in liquefiable soils.**
- 2022 12th National Conference on Earthquake Engineering (12NCEE) in Salt Lake City, USA. Oral presentation: **New insights into SSI: How structural capacity can be influenced by soil response and SSI effects.**
- 2022 12th National Conference on Earthquake Engineering (12NCEE) in Salt Lake City, USA. Oral presentation: **Damage model for underground tunnels to evaluate vulnerability and seismic risk.**
- 2021 Selected speaker at the International Workshop on Large-Scale Shake Table Testing for the Assessment of Soil-Foundation-Structure System Response for Seismic Safety of DOE Nuclear Facilities del Pacific Earthquake Engineering Research Center (PEER), Berkeley, California (USA). Oral presentation: **The Different Phenomenology of Dynamic SSI for Buildings, Bridges and Power Plants: Numerical Analysis and In-Situ Full-Scale Tests.**
- 2015 2015 World Tunnel Congress (WTC2015) & International Tunnelling and Underground Space Association (ITA/AITES) Working Group N°9, Seismic Effects. Dubrovnik, Croatia. Oral presentation: **Geotechnical Earthquake Engineering: Activities on seismic vulnerability of underground tunnels.**
- 2014 2nd European Conference on Earthquake Engineering and Seismology. Istanbul, Turkey. Oral presentation: **Seismic vulnerability of deep tunnels: numerical modelling for fully nonlinear dynamic analysis.**
- 2013 International Conference on Earthquake Geotechnical Engineering: From Case History to Practice. Istanbul, Turkey. Oral presentation: **Hazard-dependent soil amplification factors derived from 1D fully stochastic ground response analyses.**

COMPUTING SKILLS

Nonlinear dynamic analyses with soil-structure, water-soil and water-structure interaction. This competence has been used in various professional fields: (i) seismic assessment of infrastructures (e.g. tunnels), (ii) soil liquefaction analysis, (iii) seismic assessment of geotechnical systems.

Main software used: **FLAC (2D and 3D), 3DEC, ABAQUS, SAP2000, SeismoStruct, DeepSoil, ARCGIS, AutoCAD, EXCEL, MATLAB**

Principali linguaggi di programmazione conosciuti: **FORTRAN, C++**

PROFESSIONAL EXPERIENCE

Hydraulic infrastructures

- 2019-2024 **Seismic verification of underground structures of large Italian dams.** Activity: design of in-situ geotechnical and structural investigations and seismic assessment of tunnels and shafts.
Dams: Vajont, Pavana, Lago Delio, Muzzone
Contractors: ENEL, Lombardi SA, Fondazione EUCENTRE
- 2019-2021 **Definition of seismic input for preliminary and detailed design of the Rufiji Hydroelectric power plant (Tanzania, Africa).** Activity: definition of seismic input for different structures (e.g. dam, tunnels, shafts, buildings, powerhouse);
Contractors: Sinohydro, PowerChina, GEODATA, Fondazione EUCENTRE
- 2020-2021 **Seismic analysis of tunnels and shafts of the Hayarden Pumped Storage Plant. Kohhav (Israel).**
Contractors: PowerChina, GEODATA, Fondazione EUCENTRE

Road and rail infrastructures

- 2022-2023 **Seismic assessment of cut&cover tunnels.** Activity: design of in-situ geotechnical and structural investigations and seismic assessment of tunnels through nonlinear dynamic analyses with soil-structure interaction.
Contractors: Milanoserravalle Engineering, Fondazione EUCENTRE

2021-2022 Study of the legislation and definition of the seismic input of the **Candaba viaduct (Philippines)**.
Contractor: StudioCalvi

Buildings

- 2023 **Designing High-Density Housing Solutions (SADA) for post-seismic reconstruction.** Procedures for reconstruction (SADA project) to support the National Civil Protection to systematise the capacity to design, contract and construct residential buildings following seismic or other emergencies. Activity: development of an innovative system for the design and verification of foundations of seismically isolated structures.
Contractor: Protezione Civile Nazionale, Fondazione EUCENTRE
- 2023 **Feasibility study for design and construction of the new S. Matteo Hospital in Pavia.** Activity: feasibility aspects for foundations and underground works.
Contractor: Fondazione IRCCS Policlinico s. Matteo, Fondazione EUCENTRE

PUBLICATIONS IN INTERNATIONAL JOURNALS

1. Andreotti G. (2024). Short-time frequency-domain method for truly nonlinear dynamic ground response analysis: The equivalent-nonlinear approach. *Soil Dynamics and Earthquake Engineering*, 2024, 176, 108266. DOI: 10.1016/j.soildyn.2023.108266
2. Zuccolo E., Andreotti G., Calvi G.M. (2023). PSHA-Based Design Spectrum: An Application of the Design Spectrum Predictive Model for Seismic Regulation Purposes. *Journal of Earthquake Engineering*, 1-18. DOI: doi.org/10.1080/13632469.2023.2171162
3. Calvi G.M., Andreotti G. (2022). Effects of Local Soil, Magnitude and Distance on Empirical Response Spectra for Design. *Journal of Earthquake Engineering*, DOI: doi.org/10.1080/13632469.2019.1703847
4. Andreotti G., Calvi G.M. (2021). Nonlinear soil effects on observed and simulated response spectra. *Earthquake engineering & structural dynamics*, vol. 50, p. 3831-3854, ISSN: 0098-8847, doi:10.1002/eqe.3535
5. Calvi G.M., O'Reilly G.J., Andreotti G. (2021). Towards a practical loss-based design approach and procedure. *Earthquake Engineering & Structural Dynamics* 50 (14), 3741-3753. doi.org/10.1002/eqe.3530
6. Calvi G.M., Moratti M., Dacarro F., Andreotti G., Bolognini D. (2021). Feasibility study for in-situ dynamic testing of structures and geotechnical systems. *Engineering Structures*, vol. 235, ISSN: 0141-0296, doi: 10.1016/j.engstruct.2021.112085
7. Andreotti G., Calvi G.M. (2021). Design of laterally loaded pile-columns considering SSI effects: Strengths and weaknesses of 3D, 2D, and 1D nonlinear analysis. *Earthquake Engineering & Structural Dynamics*. DOI: doi.org/10.1002/eqe.3379
8. Andreotti G., Calvi G.M., Soga K., Gong C., Ding W. (2020). Cyclic model with damage assessment of longitudinal joints in segmental tunnel linings. *Tunnelling and Underground Space Technology* 103 (103472), DOI: doi.org/10.1016/j.tust.2020.103472
9. Andreotti G., Lai C.G. (2019). Use of fragility curves to assess the seismic vulnerability in the risk analysis of mountain tunnels. *Tunnelling and Underground Space Technology* 91(103008), DOI: 10.1016/j.tust.2019.103008
10. Andreotti G., Graziotti F., Magenes G. (2019). Expansion of mortar joints in direct shear tests of masonry samples: implications on shear strength and experimental characterization of dilatancy. *Materials and Structures* 52(64), DOI: 10.1617/s11527-019-1366-5
11. Andreotti G., Famà A., Lai C.G. (2018). Hazard-dependent soil factors for site-specific elastic acceleration response spectra of Italian and European seismic building codes. *Bulletin of Earthquake Engineering* 16, 5769-5800. DOI:10.1007/s10518-018-0422-9
12. Andreotti G., Graziotti F., Magenes G. (2018). Detailed micro-modelling of the direct shear tests of brick masonry specimens: The role of dilatancy. *Engineering Structures* 168, 929-949. DOI: 10.1016/j.engstruct.2018.05.019

13. Graziotti F., Guerrini G., Rossi A., Andreotti G., Magenes G. (2018). Proposal for an improved procedure and interpretation of ASTM C1531 for the in situ determination of brick-masonry shear strength. ASTM Special Technical Publication, 2018, STP 1612, pp. 13–33. DOI: 10.1520/STP16122017081
14. Andreotti G, Lai C.G., (2017). A nonlinear constitutive model for beam elements with cyclic degradation and damage assessment for advanced dynamic analyses of geotechnical problems. Part I: theoretical formulation. Bulletin of Earthquake Engineering 15(7): 2785–2801. DOI: 10.1007/s10518-017-0090-1
15. Andreotti G, Lai C.G., (2017). A nonlinear constitutive model for beam elements with cyclic degradation and damage assessment for advanced dynamic analyses of geotechnical problems. Part II: validation and application to a dynamic soil-structure interaction problem. Bulletin of Earthquake Engineering 15(7):2803–2825. DOI: 10.1007/s10518-017-0091-0
16. Baglione, V., Marcos, J. M., Canestrari, D., Griesser, M., Andreotti, G., Bardini, C., Bogliani, G. 2005. Does year-round territoriality rather than habitat saturation explain delayed natal dispersal and cooperative breeding in the carrion crow? Journal of Animal Ecology, 74:842-851. DOI: 10.1111/j.1365-2656.2005.00983.x

PUBLICATIONS IN CONFERENCE PROCEEDINGS

1. Andreotti G., Calvi G.M. (2022). New insights into SSI: How structural capacity can be influenced by soil response and SSI effects. 12th National Conference on Earthquake Engineering, NCEE 2022. Salt Lake City (USA). 27 June – 1 July 2022.
2. Andreotti G., Calvi G.M. (2022). Damage model for underground tunnels to evaluate vulnerability and seismic risk. 12th National Conference on Earthquake Engineering, NCEE 2022. Salt Lake City (USA). 27 June – 1 July 2022.
3. Andreotti G., Calvi G.M. (2020). Dilatancy model from geotechnical to structural engineering: a research case for “expert-generalist”? 17th World Conference on Earthquake Engineering, 17WCEE. Sendai (Japan). September 27 to October 2, 2021.
4. Meisina C., Bordoni M., Bonì R., Brocca L., Ciabatta L., Petaccia G., Ferraro D., Creaco E., Manenti S., Barbero G., Andreotti G., Lai C.G., Vercesi A., Valentino R., Bittelli B., Toscani G. (2019). Hydrological model for predicting shallow landslides and floods with the integration of satellite soil moisture and rainfall. Living Planet symposium. Milan (Italy), 13-17 May 2019.
5. Calvi G.M., O’Reilly G.J., Andreotti G. (2019). Re-Visiting Earthquake Resistant Design. Atti del convegno 12th Canadian Conference on Earthquake Engineering. Quebec (Canada), 19-20 June, 2019.
6. Andreotti G., Lai C.G. (2015). Methodology to Derive Damage State-Dependent Fragility Curves of underground tunnels. Atti del Convegno 6th International Conference on Earthquake Geotechnical Engineering (6ICEGE). Christchurch, New Zealand, 1-4 November 2015.
7. Andreotti G., Lai C.G. (2015). The role of overburden stress on the seismic vulnerability of deep tunnels. Geotechnical Engineering for Infrastructure and Development. XVI European Conference on Soil Mechanics and Geotechnical Engineering, ECSMGE 2015. 2, pp. 393-399.
8. Andreotti G., Lai C.G. (2014). Seismic Vulnerability of Deep Tunnels: Numerical Modeling for a Fully Nonlinear Dynamic Analysis. 2ECEES (Second European Conference on Earthquake Engineering and Seismology). Istanbul (Turkey), 25-29 August, 2014.
9. Andreotti G., Lai C. G., Martinelli M. (2013). Seismic Fragility Functions of Deep Tunnels: A New Cumulative Damage Model Based on Lumped Plasticity and Rotation Capacity. ICEGE 2013, International Conference on Earthquake Geotechnical Engineering. Istanbul (Turkey), 17-19 June, 2013.

Consapevole che chiunque rilascia dichiarazioni mendaci è punito ai sensi del codice penale e delle leggi speciali in materia, ai sensi e per gli effetti degli art. 75 e 76 dpr 445/2000. Consapevole di quanto previsto dall' art. 13 del d.lgs 196/03 codice in materia di protezione dei dati personali.

Luogo e data,

PAVIA, 14/03/2024

Firma