

CURRICULUM VITAE

(AI FINI DELLA PUBBLICAZIONE)

Davide Noè Gorini

Employment history

- June 2019-present: Post-doctoral research fellow, Department of Structural and Geotechnical Engineering, Sapienza University of Rome. The research project in which I am involved is related to the *Implicit seismic risk for infrastructures* and is supervised by Prof. Luigi Callisto (Sapienza University of Rome) and Prof. Paolo Franchin (Sapienza University of Rome). My contribution concerns the development, implementation and application of macro-element representations for geotechnical systems, such as bridge abutments, shallow and deep foundations. The final aim of the work is to reach a more rational and sustainable design of the overall soil-bridge system under seismic conditions that would lead to a reduced seismic risk for infrastructures.

Education

- February to May 2018: visiting PhD student at Massachusetts Institute of Technology in Boston (MIT) to collaborate with Prof. Andrew John Whittle on the development of a thermodynamic, inertial macro-element for bridge abutments.
- Doctor of Philosophy in Structural and Geotechnical Engineering, achieved on February 26, 2019 at the University of Rome La Sapienza, with the overall grade of *Excellent cum laude*. In November, 2015 I won the public competition for the admission to the PhD in Structural and Geotechnical Engineering at the University of Rome La Sapienza, reaching the first position in the ranking competition out of more than twenty candidates. The three-year PhD program (November 2015 to October 2018) was supervised by Prof. Luigi Callisto. The title of the PhD thesis is "*Soil-structure interaction for bridge abutments: two complementary macro-elements*". In my PhD, I developed a semi-direct approach to account for the soil-abutment interaction effects in the evaluation of the seismic performance of bridges. This was accomplished through the definition of two complementary macro-elements simulating the nonlinear and inertial effects of the soil-abutment-superstructure interaction in both the structural analysis of the bridge and the geotechnical analysis of the soil-abutment system.
- Degree in Civil Engineering with specialization in Geotechnics, achieved on January 28, 2015 at the University of Rome La Sapienza, with the overall grade of 110/110 *cum laude* (weighted average: 30.0), relator Prof. Luigi Callisto and correlator Prof. Fabio Brancaloni (Sapienza University of Rome). In my thesis I developed the "*Dynamic soil-structure interaction for suspension bridges foundations*", focusing on the use of innovative anti-seismic technologies.
- Bachelor's Degree in Civil Engineering, achieved on December 20, 2011 at the University of Rome La Sapienza with the overall grade of 110/110 (weighted average: 27.7).

- Diploma (Project Five), Surveyor, achieved on July 2, 2008, at the Technical Institute for Surveyors "SA ITCG Gaetano Martino" in Rome with the overall grade of 96/100.

Awards

- On October 1, 2016 I was awarded with the “*Fourth national prize for the best Master’s Degree thesis in memory of Salvatore Fazio*”, by the University of Catania (Italy).
- On April 23, 2015 I was awarded the prize “*Excellent Graduate in the academic year 2014/2015*”, by the University of Rome La Sapienza (Italy).

Work experience

February 2019: Collaboration with the geotechnical research group at the University of Rome La Sapienza for the design of the foundations of a new multi-span girder bridge in Italy. My work focused on the definition of the subsoil model and the evaluation of the dynamic impedance matrix for the deep foundations of the bridge.

February to April 2019: I collaborated with the Department of Structural and Geotechnical Engineering of the University of Rome La Sapienza to work on the research project “*Study of dynamic soil-structure interaction for bridge abutments*”. The research focused on a more extensive validation of the analysis method developed in my PhD, considering different soil-bridge systems subjected to seismic loading.

November 2018: Collaboration with the geotechnical research group at the University of Rome La Sapienza for the design of a new suspension bridge in Braila (Romania). My work focused on the evaluation of the risk of liquefaction for the foundation soils of the bridge, accomplished through nonlinear dynamic analyses on numerical models of the bridge subsoil.

August to September 2017: Collaboration with the Department of Structural and Geotechnical Engineering of the University of Rome La Sapienza for evaluating the seismic hazard adjustment of an existing masonry bridge in Italy. My contribution consisting in incorporating in the global model of the bridge the effects of the interaction with the soil, both for the pier foundations and the abutments.

September to October 2016: Collaboration with the Department of Structural and Geotechnical Engineering of the University of Rome La Sapienza concerning the Panama Canal expansion project. My contribution consisted in studying the seismic hazard for the site of the Panama Canal in order to define the seismic demand for the locks, highlighting the limits of applicability of selecting and scaling procedures of the seismic input.

February to July 2015: I collaborated with the Department of Structural and Geotechnical Engineering of the University of Rome La Sapienza to analyse specific aspects concerning innovative anti-seismic technologies.

2009 to 2015: I assisted students of the Faculty of Engineering and Architecture in the preparation of their exams of Mathematics, Geometry, Physics, Continuum Mechanics and Structural Analysis and Design.

2005 to 2014: I gave private lessons of Mathematics and Physics to High School students of Scientific, Classical and Technical Institutes.

Computer skills

Ability to use the following programming languages:

- FORTRAN;
- C and C++;
- TCL;
- MATLAB;
- MATHEMATICA.

Ability to use the following software:

- MICROSOFT OFFICE EXCEL, WORD and POWERPOINT;
- VISUAL STUDIO;
- OPENSEES, OPENSEESSP and OPENSEESMP;
- FLAC 2D and FLAC 3D;
- PLAXIS 2D and PLAXIS 3D;
- ABAQUS;
- SAP2000;
- GID;
- OPTUM 2G and 3G;
- AUTOCAD;
- LATEX;
- LYX;
- DYNA 6;
- GRAPHER;
- SURFER;
- SEISMOSIGNAL and SEISMOSTRUCT;
- GEOSTUDIO;
- PARATIEPLUS.

I am passionate about hardware optimisation to carry out very demanding numerical simulations of seismic scenarios on large soil-structure domains. In this regard, I have experience in using high performance computing, through the supercomputer facilities at:

- TACC: Texas Advanced Computing Center;
- CINECA: Italian Consortium for High Performance Computing.

Language

Italian mother tongue and advanced knowledge of English.

Immediately after my graduation I attended an English intensive course at the Shenker Institute.

I lived in Cambridge from March to July 2015, attending an English course at Embassy English School in Cambridge during which I completed the Intermediate level (B2).

I did the IELTS test on July 23rd, 2015 getting the overall grade of 6.

In 2016, I attended an Advanced English course at British Council in Rome in which I completed the level C1.

Current level of English: writing C1, reading C2, speaking C1, listening C2.

Research funding

1. Post-doc studentship. Research project *Study of dynamic soil-structure interaction for bridge abutments*. Funding released by Sapienza University of Rome, Italy, February to April 2019.
2. Scholarship for PhD mobility. Research project *Dynamic soil-abutment-superstructure interaction and its influence on the seismic performance of bridges*. Funding released by Sapienza University of Rome, Italy, to spend a period as visiting student at the Massachusetts Institute of Technology (Department of Civil and Environmental Engineering) from February to June, 2018.
3. ISCRA supercomputing research project. Research project *Seismic soil-abutment-superstructure interaction*. Funding released by CINECA (Italian Consortium for High Performance Computing) to use the supercomputing resources allocated by ISCRA (Italian SuperComputing Resource Allocation), from November, 2017 to July, 2018.
4. Finanziamento di Ateneo per la ricerca scientifica – Anno 2017. Research project *Dynamic soil-abutment-superstructure interaction: phenomenology and design*. Funding released by Sapienza University of Rome, Italy, for the academic year 2017-2018.
5. Finanziamento di Ateneo per la ricerca scientifica – Anno 2016. Research project *Dynamic soil-abutment-superstructure interaction and seismic performance of girder bridges*. Funding released by Sapienza University of Rome, Italy, for the academic year 2016-2017.
6. PhD studentship released by the Department of Structural and Geotechnical Engineering, Sapienza University of Rome, Italy, for the period from November 1, 2015 to October 30, 2018.
7. Co. Co. Co. contract (Coordinated and continuative collaboration contract). Research project *Dynamic soil-structure interaction for the dissipative foundations of long-span suspension bridges*. Collaboration with the Department of Structural and Geotechnical Engineering, Sapienza University of Rome, Italy, from February to July 2015.

Invited lectures and seminars

1. Davide Noè Gorini, “Modelling of soil-structure interaction for girder bridges”, Seminar for the 4th International Short Course on OpenSees – Seismic Analysis of Structures using OpenSees: Finite Element-based Framework and Civil Engineering Applications, University of Rome La Sapienza, Italy, March 27th-29th, 2019.
2. Davide Noè Gorini, “Dynamic soil-structure interaction”, Seminar for the academic course of Bridge Design, University of Rome La Sapienza, Italy, April 6th, 2017.
3. Davide Noè Gorini, “Dynamic soil-structure interaction”, Seminar for the academic course of Bridge Design, University of Rome La Sapienza, Italy, May 12th, 2016.

Teaching activities

2019/2020: teaching assistant of the academic course *Soil Mechanics*, Prof. Luigi Callisto, Sapienza University of Rome.

2019/2020: teaching assistant of the academic course *Geotechnical Earthquake Engineering*, Prof. Luigi Callisto, Sapienza University of Rome.

2018/2019: teaching assistant of the academic course *Soil Mechanics*, Prof. Luigi Callisto, Sapienza University of Rome.

2018/2019: teaching assistant of the academic course *Geotechnical Earthquake Engineering*, Prof. Luigi Callisto, Sapienza University of Rome.

Research interests

- dynamic soil-structure interaction for bridges and buildings;
- macro-element models for geotechnical systems;
- dissipative foundations for seismic isolation of buildings and bridges;
- seismic performance and design of anti-seismic technologies, such as Tuned Mass Dampers and viscous dampers, including soil-structure interaction effects.
- constitutive modelling for geo-materials with particular focus on thermodynamic-based formulations;
- computational mechanics;
- optimisation of the seismic performance of soil-structure systems using genetic algorithms;
- statistical and probabilistic analysis of data.

Reviewer for the following peer-reviewed scientific journals

- *International Journal for Numerical and Analytical Methods in Geomechanics* (2020 to date);
- *ASCE Journal of Geotechnical and Geoenvironmental Engineering* (2020 to date).

Publication list

Books

- B1. **Gorini, D.N.** (2019): “*Soil-structure interaction for bridge abutments: two complementary macro-elements*”, PhD thesis, Sapienza University of Rome, Italy (<https://iris.uniroma1.it/handle/11573/1260972>).

Journal papers

- J1. Callisto, L. and **Gorini, D.N.** (2020): “Seismic behaviour of a suspension bridge with dissipative foundations”, *Italian Geotechnical Journal*, doi.org/10.19199/2020.1.0557-1405.022.
- J2. **Gorini, D.N.**, Whittle A.J. and Callisto, L. (2020): “Ultimate limit states of bridge abutments”, *Journal of Geotechnical and Geoenvironmental Engineering*, DOI: 10.1061/(ASCE)GT.1943-5606.0002283.
- J3. **Gorini, D.N.** and Callisto, L. (2020): “A method to analyse bridge abutments accounting for the dynamic behaviour of the superstructure”, *Geotechnique*, published online 14th November 2019, DOI: 10.1680/jgeot.19.ti.012, <https://www.icevirtuallibrary.com/doi/abs/10.1680/jgeot.19.ti.012>.
- J4. **Gorini, D.N.** and Callisto, L. (2019): “Seismic performance and design approach for friction dissipative foundations”, *Soil Dynamics and Earthquake Engineering*, Vol. 123, 2019, pp. 513-519, DOI: 10.1016/j.soildyn.2019.05.006.
- J5. **Gorini, D.N.** and Callisto, L. (2016): “Predicting the dynamic response of friction dissipative foundations using a modified Newmark model”, *Procedia Engineering*, Vol. 158, 2016, pp. 170-175, DOI: 10.1016/j.proeng.2016.08.424.

Chapters

- C1. **Gorini, D.N.** and Callisto, L. (2020): “A coupled study of soil-abutment-superstructure interaction”, *Springer Lecture Notes in Civil Engineering “Geotechnical Research for Land Protection and Development” (CNRIG2019)*, ISBN 978-3-030-21358-9 ISBN 978-3-030-21359-6 (eBook), Vol. 40, 2020, pp. 565-574.

- C2. **Gorini, D.N.** Callisto, L. and Whittle A.J. (2019): “Numerical evaluation of the modal characteristics of a bridge abutment”, *Proceedings of the 7th International Conference on Computational Methods in Structural Dynamics and Earthquake Engineering (COMPADYN 2019)*, Crete, Greece, ISBN (set): 978-618-82844-5-6, ISBN (vol I): 978-618-82844-6-3, DOI: 10.7712/120119.7050.19836.
- C3. **Gorini, D.N.**, Whittle., A.J. and Callisto, L. (2019): “Ultimate design capacity of bridge abutments”, *Earthquake Geotechnical Engineering for Protection and Development of Environment and Constructions: Proceedings of the 7th International Conference on Earthquake Geotechnical Engineering*, (ICEGE 2019), pp. 2682-2689, ISBN 978-0-367-14328-2, DOI: 10.1201/9780429031274, Rome, Italy.
- C4. **Gorini, D.N.** and Chisari, C. (2019): “Effect of soil-structure interaction on seismic performance of Tuned Mass Dampers in buildings”, *Earthquake Geotechnical Engineering for Protection and Development of Environment and Constructions: Proceedings of the 7th International Conference on Earthquake Geotechnical Engineering*, (ICEGE 2019), pp. 2690-2697, ISBN 978-0-367-14328-2, DOI: 10.1201/9780429031274, Rome, Italy.

Conference proceedings and other non-journal articles

- **Fully refereed publications**

- P1. **Gorini, D.N.** Callisto, L., Whittle A.J. and Sessa S. (2019): “*An inertial macro-element of abutments for nonlinear analysis of bridges*”, Proceedings of OpenSEES days Eurasia 2019 - First Eurasian Conference on OpenSees, Editors Asif Usmani, Giorgio Monti and M. Anwar Orabi, ISBN 978-962-367-832-2, Hong Kong.
- P2. **Davide Noè Gorini**, Andrew J. Whittle and Luigi Callisto (2018): “*Stati Limite Ultimi per spalle da ponte*”, IARG 2018 (Incontro Annuale dei Ricercatori di Geotecnica - Annual Meeting of Geotechnical Researchers), ISBN 978-88-975170-1-6, Genova, Italy.
- P3. **Davide Noè Gorini** and Luigi Callisto (2017): “*Development of equivalent structural models for the coupled analysis of the dynamic soil-structure interaction*”, Proceedings of the XVII Convegno ANIDIS “L’ingegneria sismica in Italia”, ISBN: 9788867418541, Pistoia, Italy.
- P4. **Davide Noè Gorini** and Luigi Callisto (2017): “*Studio dell’interazione dinamica terreno-spalla-sovrastuttura per una spalla da ponte*”, IARG 2017 (Incontro Annuale dei Ricercatori di Geotecnica - Annual Meeting of Geotechnical Researchers), ISBN 978-88-99432-30-0, Matera, Italy.

- P5. **Davide Noè Gorini** and Luigi Callisto (2017): “*Study of the dynamic soil-abutment-superstructure interaction for a bridge abutment*”, First European Conference on OpenSees, ISBN 978-972-752-221-7, Porto, Portugal.
- P6. **Davide Noè Gorini** and Luigi Callisto (2016): “*Dynamic soil-structure interaction for a long-span suspension bridge with dissipative foundations*”, Proceedings of the 4th International Workshop on “Dynamic Interaction of Soil and Structure (DISS_15)”, pp. 289-297, ISBN: 978-88-940114-2-5, Rome, Italy.
- P7. **Davide Noè Gorini** and Luigi Callisto (2015): “*Interazione dinamica terreno-struttura per le fondazioni di un ponte di grande luce*”, IARG 2015 (Incontro Annuale dei Ricercatori di Geotecnica - Annual Meeting of Geotechnical Researchers), Cagliari, Italy.

- **Referred by abstract only**

- A1. **Davide Noè Gorini** and Luigi Callisto (2016): “*Dynamic soil-structure interaction for a long-span suspension bridge with dissipative foundations*”, Proceedings of the 4th International Workshop on “Dynamic Interaction of Soil and Structure (DISS_15)”, Rome, Italy.

Journal papers and fully referred publications under review

Gorini, D.N., Whittle A.J. and Callisto, L.: “An inertial macro-element for bridge abutments”, Submitted to *Geotechnique* (2020).

Roma, 27/05/2020

CURRICULUM STUDIORUM

Exams achieved for the Master's degree - Sapienza University of Rome

Civil Engineering with specialisation in Geotechnical Engineering

1. Foundations and retaining structures (Prof. Sebastiano Rampello, credits: 12): 30/30 *cum laude*
2. Earthquake engineering (Prof. Rosario Gigliotti, credits: 12): 29/30
3. Road design and construction (Prof. Antonio D'Andrea, credits: 12): 30/30 *cum laude*
4. Marine structures (Prof. Roberto Guercio, credits: 12): 27/30
5. Geotechnical earthquake engineering (Prof. Luigi Callisto, credits: 6): 30/30 *cum laude*
6. Complements of soil mechanics (Prof. Salvatore Miliziano, credits: 6): 30/30 *cum laude*
7. Excavations and tunnels in urban area (Prof. Luigi Callisto, credits: 6): 30/30
8. Slope stability (Prof. Alberto Burghignoli, credits: 6): 30/30 *cum laude*
9. Deep tunnels (Prof.ssa Tatiana Rotonda, credits: 6): 30/30
10. Numerical hydraulics (Prof. Giovanni Cannata, credits: 6): 30/30
11. Bi-dimensional structures (Prof. Achille Paolone, credits: 6): 28/30
12. Electrotechnics (Prof. Alberto Geri, credits: 6): 30/30
13. Structural retrofitting (Prof. Domenico Liberatore, credits: 6): 30/30 *cum laude*

Weighted average: 30.0. Overall grade: 110/110 *cum laude*.

Exams achieved for the Bachelor's degree - Sapienza University of Rome

Civil Engineering

1. Hydrology and hydraulic infrastructures (Prof. Roberto Guercio, credits: 12): 30/30 *cum laude*
2. Geometry (Prof.ssa Lia Piccolella, credits: 12): 30/30 *cum laude*
3. Continuum mechanics I (Prof. Achille Paolone, credits: 6): 30/30
4. Continuum mechanics II (Prof. Achille Paolone, credits: 12): 30/30

5. Physics (Prof. Luciano Mistura, credits: 12):	30/30
6. Structural analysis and design (Prof. Franco Bontempi, credits: 12):	26/30
7. Mathematical analysis I (Prof.ssa Maria Rosaria Lancia, credits: 12):	24/30
8. Mathematical analysis II (Prof. Fabio Scarabotti, credits: 6):	27/30
9. Mathematical physics (Prof.ssa Nicoletta Ianiro, credits: 12):	21/30
10. Soil mechanics (Prof. Alberto Burghignoli, credits: 9):	30/30
11. Infrastructures (Prof.ssa Paola Di Mascio, credits: 9):	30/30
12. Hydraulics (Prof. Francesco Gallerano, credits: 9):	28/30
13. Applied mechanics (Prof. Carlo Marchiori, credits: 6):	30/30
14. Probability and statistics (Prof. Angelo Gilio, credits: 6):	27/30
15. Technical physics (Prof. Stefano Grignaffini, credits: 6):	28/30
16. Topography (Prof.ssa Maria Antonietta Marsella, credits: 6):	29/30
17. Chemistry (Prof.ssa Isabella Chiarotto, credits: 6):	25/30
18. Technical architecture (Prof. Massimo Valente, credits: 6):	25/30
19. Technology of materials (Prof.ssa Teresa Mangialardi, credits: 6):	23/30
20. Technical drawing (Prof. Angelo Quoiani, credits: 6):	27/30
21. Computer skills (Prof. Giuseppe Loprencipe, credits:3):	suitable
22. Foreign language - English	suitable

Weighted average: 27.7. Overall grade: 110/110.

Roma, 27/05/2020