Curriculum Vitae

Davide Noè Gorini

- **EDUCATION**

2019, Feb 26 PhD, overall grade: *Excellent cum laude*
Thesis: *Soil-structure interaction for bridge abutments: two complementary macro-elements*
Department of Structural and Geotechnical Engineering, Sapienza University of Rome, Italy
Supervisor: Prof. Luigi Callisto, Sapienza University of Rome
Advisor: Prof. Andrew John Whittle, Massachusetts Institute of Technology

2015, Jan 28 Master, overall grade: 110/110 *cum laude* (weighted average: 30.0/30)
Thesis: *Dynamic soil-structure interaction for suspension bridges foundations*
Supervisor: Prof. Luigi Callisto, Faculty of Civil and Industrial Engineering, Sapienza University of Rome, Italy

2011, Dec 20 Bacherol, overall grade: 110/110 (weighted average: 27.7/30)
Faculty of Civil and Industrial Engineering, Sapienza University of Rome, Italy

- **CURRENT POSITION**

2019 to date Postdoctoral researcher
Department of Structural and Geotechnical Engineering, Sapienza University of Rome, Italy

- **FELLOWSHIPS**

2018 Scholarship as visiting PhD student (February to May, 2018)
Department of Civil and Environmental Engineering, Massachusetts Institute of Technology (MIT), Massachusetts (USA)

- **AWARDS**

2016 Fourth national prize for the best Master's Degree thesis in memory of Salvatore Fazio
Released by University of Catania, Italy

2015 Excellent Graduate in the academic year 2014/2015
Release by Sapienza University of Rome, Italy

- **SUPERVISION OF GRADUATE AND UNDERGRADUATE STUDENTS**

Ph.D.

2022 to date Yufeng Tang
Influence of the approaching slab in the performance of bridges
Department of Structural and Geotechnical Engineering, Sapienza University of Rome, Italy
Supervisors: Prof. Bruno Briseghella, Prof. Camillo Nuti, Prof. Junqing Xue; Advisors: Prof. Luigi Callisto, **Davide Noè Gorini**

2021 to date Giuseppe Lombardi
Seismic performance and design of tunnels interacting with dams
Department of Structural and Geotechnical Engineering, Sapienza University of Rome, Italy
Supervisor: Prof. Luigi Callisto; Tutor: **Davide Noè Gorini**

2020 to date Pasquale Roberto Marrazzo
Large mass ratio Tuned Mass Dampers in soil-structure systems: from advanced numerical modelling to an optimised design criterion
Faculty of Civil Engineering, University of Salerno, Italy
Supervisors: Prof. Rosario Montuori, Prof. Elide Nastri; Advisor: **Davide Noè Gorini**

2021-2022 Tony Fierro
Implementation of a bounding surface constitutive model in OpenSees for soil liquefaction analysis
Department of Civil Engineering, University of Molise, Italy

Supervisor: Prof. Filippo Santucci De Magistris; Advisors: Dr. Massimina Castiglia, **Davide Noè Gorini**

2019-2022 Domenico Gallese
Seismic response of integral abutment bridges
Department of Structural and Geotechnical Engineering, Sapienza University of Rome, Italy
Supervisor: Prof. Luigi Callisto; Tutor: **Davide Noè Gorini**

M.Sc.

2021 Guglielmo Clarizia
Influence of soil-structure interaction on the effectiveness of large mass ratio Tuned Mass Dampers
Faculty of Civil Engineering, University of Salerno, Italy
Supervisors: Prof. Rosario Montuori, Prof. Elide Nastri; Advisor: **Davide Noè Gorini**

2018 Alessandro Capodicasa
Semi-coupled numerical procedures for the study of soil-structure interaction for buildings under seismic conditions
Department of Structural and Geotechnical Engineering, Sapienza University of Rome, Italy
Supervisor: Prof. Luigi Callisto; Tutor: **Davide Noè Gorini**

- **TEACHING ACTIVITIES**

2020 – 2021 teaching contract – *Geotechnical Engineering* (in English, ICAR/07, 9 ECTS), degree in Sustainable Building Engineering, Sapienza University of Rome, Italy

2018 to date teaching assistant – *Geotechnical Earthquake Engineering* (ICAR/07, 6 ECTS), degree in Civil Engineering, Sapienza University of Rome, Italy

2018 to date teaching assistant – *Soil Mechanics* (ICAR/07, 9 ECTS), degree in Civil Engineering, Sapienza University of Rome, Italy

- **REVIEWING ACTIVITIES**

since 2021 Reviewer, peer-reviewed journal *Applied Sciences*, published online by MDPI

since 2021 Reviewer, peer-reviewed journal *Structures*, England, world ranking in the field: 65

since 2021 Reviewer, peer-reviewed journal *Eartkquake Engineering and Structural Dynamics*, England, world ranking in the field: 4

since 2020 Reviewer, peer-reviewed journal *Mathematical Problems in Engineering*.

since 2020 Reviewer, peer-reviewed journal *Advances in Civil Engineering*.

since 2020 Reviewer, peer-reviewed journal *International Journal for Numerical and Analytical Methods in Geomechanics*, England, world ranking in the field: 19

since 2020 Reviewer, peer-reviewed journal *Journal of Geotechnical and Geoenvironmetal Engineering*, United States, world ranking in the field: 10

- **MEMBERSHIPS OF SCIENTIFIC SOCIETIES**

2020 to date Member, *Italian Geotechnical Association (AGI)*

2020 to date Member, *International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE)*

- **RESEARCH INTERESTS**

Topics effectively investigated by far

since 2022 advances in thermodynamic-based constitutive models for geotechnical and structural systems at the meso- and macro-scale, such as hydro-mechanical coupling and rate-dependency under dynamic conditions

since 2022 multi-variable probabilistic approaches for the seismic assessment of slopes

since 2019 performance-based design and seismic risk assessment for bridges and buildings

since 2018 computational mechanics, high-performance computing, hardware optimization

since 2018 development of computational tools for civil engineering applications in the analysis framework OpenSees

since 2018 constitutive modelling for geo-materials with particular focus on thermodynamic-based formulations
since 2018 global sensitivity analysis methodologies for structural optimization of dynamic soil-structure interaction problems
since 2017 seismic performance and design of anti-seismic technologies, such as Tuned Mass Dampers and viscous dampers, including soil-structure interaction effects
since 2017 macroelement approach for seismic assessment of bridges and buildings
since 2015 dissipative foundations and base isolation systems for seismic protection
since 2015 dynamic soil-structure interaction

- **COMPUTER SKYLLS**

Ability to use the following programming languages and software

- C and C++
- TCL
- MATLAB
- VISUAL STUDIO
- FORTRAN
- MATHEMATICA
- OPENSEES, OPENSEESSP and OPENSEESMP
- FLAC 2D and FLAC 3D
- PLAXIS 2D and PLAXIS 3D
- ABAQUS
- SAP2000
- GID
- OPTUM 2G and 3G
- DYNA 6
- LATEX
- LYX
- AUTOCAD

I am passionate about hardware optimisation to carry out very demanding numerical simulations on large domains. In this regard, I have experience in assembly custom, multi-core workstations and in using high performance computing, the latter through the supercomputer facilities of the Texas Advanced Computing Center (2019 to date).

- **NEW DEVELOPMENTS FOR THE OPENSEES ENVIRONMENT**

Uniaxial materials

2019 *1DSAME*: generalised Iwan model for bridge abutments (Gorini, 2019)

Multiaxial materials

2022 *SANICLAY*: bounding surface plasticity model for fine-grained soils (Seidalinov and Taiebat, 2014)
2021 *3DSAME*: 3 d.o.f. macroelement for semi-integral bridge abutments (Gorini et al., 2019)
2021 *6DSAME*: 6 d.o.f. macroelement for integral bridge abutments (Gorini and Callisto, 2020)
2021 *5DSAME*: 5 d.o.f. macroelement for deep foundations (Gorini and Callisto, 2021)
2021 *NTUASand*: bounding surface plasticity model for coarse-grained soils (Papadimitriou and Bouckovalas, 2002)

Finite elements

2021 *6DZeroLength*: zero-length finite element with fully coupled translational-rotational response (Gorini, 2021)

Automatised numerical procedures

2022 parametric mesh for soil-tunnel systems
2021 modal analysis of soil-structure domains
2021 parametric assignment of dynamic boundary conditions to complex soil-structure domains
2020 parametric mesh for multi-span soil-bridge systems

- **COLLABORATIONS**

2022 to date — Dr. Yufeng Tang, Prof. Bruno Briseghella, Prof. Camillo Nuti, Prof. Junqing Xue, Prof. Luigi Callisto
University of Fuzhou (China), University of Roma 3 (Italy), Sapienza University of Rome (Italy)
Approach slab-soil interaction due to thermal effects in jointless bridges

2022 to date — Dr. Fabio Rollo
Department of Structural and Geotechnical Engineering, Sapienza University of Rome, Italy
Multi-variable probabilistic assessment of the seismic risk for slopes

2021 to date — Prof. Filippo Santucci De Magistris, Dr. Tony Fierro and Dr. Massimina Castiglia
Department of Civil Engineering, University of Molise, Italy
Implementation of advanced constitutive models for soils in OpenSees and their application in dynamic analyses of coupled soil-tunnel interaction models

2020 to date — Prof. Rosario Montuori, Prof. Elide Nastri and Dr. Pasquale Marrazzo
Department of Civil Engineering, University of Salerno, Italy
Seismic performance and design of large mass ratio Tuned Mass Dampers for seismic protection of soil-structure systems

2018 to date — Prof. Andrew John Whittle
Massachusetts Institute of Technology (MIT), Massachusetts, United States
Development of hyper-plastic constitutive laws for bridge abutments

2017 to date — Dr. Corrado Chisari
Department of Architecture and Industrial Design, University of Campania "Luigi Vanvitelli", Italy
Optimised design for anti-seismic technologies considering dynamic soil-structure interaction

2019, Jan-Apr — Consulting activity
Department of Structural and Geotechnical Engineering, Sapienza University of Rome, Italy
Seismic design of the foundations of a new multi-span bridge in Italy

2019, Apr-Jun — Geotechnical research group
Department of Structural and Geotechnical Engineering, Sapienza University of Rome, Italy
Study of dynamic soil-structure interaction for bridge abutments

2018, Sep-Dec — Consulting activity
Department of Structural and Geotechnical Engineering, Sapienza University of Rome, Italy
Seismic design of the foundations of a new suspension bridge in Braila (Romania)

2017, Aug-Oct — Consulting activity
Department of Structural and Geotechnical Engineering, Sapienza University of Rome, Italy
Seismic hazard adjustment of an existing masonry bridge in Italy

2017, Sep-Nov — Consulting activity
Department of Structural and Geotechnical Engineering, Sapienza University of Rome, Italy
Seismic hazard assessment for the site of the Panama Canal

2015, Feb-Jul — Geotechnical research group
Department of Structural and Geotechnical Engineering, Sapienza University of Rome, Italy
Friction dissipative foundations for seismic protection of long-span bridges

- **ORGANISATION OF SCIENTIFIC MEETINGS AND COURSES**

2023 — *Soil-structure interaction in OpenSees: from the basics to advanced modelling*
Main organizer (Winter school, February 2023)

2019 — *4th International Short Course on Seismic Analysis of Structures using OpenSees: Finite Element-based Framework and Civil Engineering Applications*
Part of the organizing committee
Rome, Italy, 27-29 March 2019

- **RESEARCH FUNDING**

2018, Feb-Jun 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

2018 ISCRA supercomputing research project
Research project *Seismic soil-abutment-superstructure interaction*
Funding released by CINECA (Italian Consortium for High Performance Computing)

2018 University funding for scientific research
Research project *Dynamic soil-abutment-superstructure interaction: phenomenology and design*
Funding released by Sapienza University of Rome, Italy

2017 University funding for scientific research
Research project *Dynamic soil-abutment-superstructure interaction and seismic performance of girder bridges*
Funding released by Sapienza University of Rome, Italy

2015, Feb-Jul Coordinated and Continuative Collaboration contract
Research project *Dynamic soil-structure interaction for the dissipative foundations of long-span suspension bridges*.
Department of Structural and Geotechnical Engineering, Sapienza University of Rome, Italy.

- **INVITED LECTURES AND SEMINARS**

2022, Mar *Anti-seismic soil-structure systems: dynamic coupling, dominant dissipative features and novel solutions*
Scientific seminar - doctorate program in Structural and Geotechnical Engineering
University of Salerno, Salerno, Italy

2020, Dec *A constitutive glance at the irreversible behaviour of soil*
Scientific seminar - academic course of Soil Mechanics
Sapienza University of Rome, Rome, Italy.

2019, Mar *Modelling soil-structure interaction for girder bridges*
Scientific seminar - "4th International Short Course on OpenSees – Seismic Analysis of Structures using OpenSees: Finite Element-based Framework and Civil Engineering Applications"
Rome, Italy

2017, Apr *Dynamic soil-structure interaction*
Scientific seminar - academic course of Bridge Design
Sapienza University of Rome, Rome, Italy

2016, May *Dynamic soil-structure interaction*
Scientific seminar - academic course of Bridge Design
Sapienza University of Rome, Rome, Italy

- **LANGUAGE**

- Italian mother tongue
- advanced knowledge of English: writing C1, reading C2, speaking C1, listening C2.

- **OTHER PERSONAL ACTIVITIES**

2009 - 2015 volunteer tutoring of Mathematics, Geometry, Physics, Continuum Mechanics, Soil Mechanics, Structural Analysis and Design to undergraduates in Civil, Mechanical Engineering and Architecture at Sapienza University of Rome

2005 - 2015 Mathematics and Physics tutoring to high School students

1999 - 2015 Competitive practice at the agonistic level of basketball and rowing

- **PUBLICATION LIST**

Dissertation

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. **Gorini, D.N.** and Chisari, C. (2022): *Impact of soil-structure interaction on the effectiveness of Tuned Mass Dampers*, Earthquake Engineering & Structural Dynamics, Vol. 51(6), pp. 1501-1521, doi: 10.1002/eqe.3625

J2. **Gorini, D.N.** and Callisto, L. (2021): *Generalised ultimate loads for piled foundations*, Acta Geotechnica, https://doi.org/10.1007/s11440-021-01386-4

J3. **Gorini, D.N.**, Callisto, L. and Whittle A.J. (2021): *Dominant responses of bridge abutments*, Soil Dynamics and Earthquake Engineering, DOI: https://doi.org/10.1016/j.soildyn.2021.106723

J4. **Gorini, D.N.**, Callisto, L. and Whittle A.J. (2020): *An inertial macroelement for bridge abutments*, Geotechnique, Vol. 72(3), pp. 247-259, DOI: https://doi.org/10.1680/jgeot.19.P.397

J5. 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

J6. **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

J7. **Gorini, D.N.** and Callisto, L. (2020): *A macro-element approach to analyse bridge abutments accounting for the dynamic behaviour of the superstructure*, Geotechnique, Vol. 70(8), pp. 711-719, DOI: 10.1680/jgeot.19.ti.012

J8. **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

J9. **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

Fully referred 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), Vol. 40, 565-574, https://doi.org/10.1007/978-3-030-21359-6_60

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 (COMPDYN 2019), Crete, Greece, 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, Rome, Italy, DOI: 10.1201/9780429031274

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, Rome, Italy, DOI: 10.1201/9780429031274

Conference papers

P1. **Gorini, D.N.**, and Callisto, L. (2021): *Uno sguardo termodinamico alla risposta di fondazioni profonde*, Proceedings of the Annual Meeting of Geotechnical Researchers - IARG2021, ISBN 9788897517153, http://www.gnig.it/IARG2021/Gorini_DavideNoe.pdf

P2. Gallese, D., **Gorini, D.N.**, and Callisto, L. (2021): *Effetti dell'interazione terreno-struttura sul comportamento sismico di ponti integrali a singola campata*, Proceedings of the Annual Meeting of Geotechnical Researchers - IARG2021, ISBN 9788897517153, http://www.gnig.it/IARG2021/Gallese_Domenico.pdf

P3. Clarizia, G., **Gorini, D.N.**, Marrazzo, P., Nastri, E., and Montuori, R. (2021): *A glance at the effectiveness of large mass ratio TMDs in a coupled soil-structure system*, Proceeding of the 19th International Conference of numerical analysis and applied mathematics - ICNAAM 2021, Rhodes, Greece (20-26 September 2021)

P4. **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

P5. **Gorini, D.N.**, Andrew J. Whittle and Callisto, L. (2018): *Stati Limite Ultimi per spalle da ponte*, Proceedings of the Annual Meeting of Geotechnical Researchers - IARG 2018, ISBN 978-88-975170-1-6, Genova, Italy

P6. **Gorini, D.N.** and Callisto, L. (2017): *Development of equivalent structural models for the coupled analysis of the dynamic soil-structure interaction*, Proceedings of the XVII Conference ANIDIS "Earthquake Engineering in Italy", ISBN: 9788867418541, Pistoia, Italy

P7. **Gorini, D.N.** and Callisto, L. (2017): *Studio dell'interazione dinamica terreno-spalla-sovrastruttura per una spalla da ponte*, Proceedings of the Annual Meeting of Geotechnical Researchers - IARG 2017, ISBN 978-88-99432-30-0, Matera, Italy

P8. **Gorini, D.N.** and Callisto, L. (2017): *Study of the dynamic soil-abutment-superstructure interaction for a bridge abutment*, Proocedings of the First European Conference on OpenSees, ISBN 978-972-752-221-7, Porto, Portugal

P9. **Gorini, D.N.** and Callisto, L. (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

P10. **Gorini, D.N.** and Callisto, L. (2015): *Interazione dinamica terreno-struttura per le fondazioni di un ponte di grande luce*, Proceedings of the Annual Meeting of Geotechnical Researchers - IARG 2015, Cagliari, Italy

Davide Noè Gorini

Rome, 27 May 2022