



DEPARTMENT OF STRUCTURES FOR ENGINEERING AND ARCHITECTURE
PHD PROGRAM IN
STRUCTURAL, GEOTECHNICAL ENGINEERING AND SEISMIC RISK

CYCLE XXXVIII

The undersigned prof. Fulvio Parisi (PO ☐ PA ☒ Researcher ☐) at the Department of Structures for Engineering and Architecture (S.S.D. ICAR/09 Structural Engineering)

ASKS

To be included in the list of PhD tutors for cycle XXXVIII.

1. Curriculum vitae (max 500 words)

Fulvio Parisi is Associate Professor of Structural Engineering at University of Naples Federico II, Italy, and Associate Researcher of the National Research Council of Italy (CNR).

He teaches the courses entitled “Design and Retrofit of Masonry Structures” and “Diagnosis and Therapy of Structural Failures”, giving many invited lectures in different universities and research centres across Europe and USA. He is a Scientific Board Member and teacher of “Structural Failures and Collapses” in the post-graduate MSc Programme in Forensic Engineering.

He is Associate Editor of 3 international journals and Editorial Board member of 4 international journals. In almost 20 research projects, his research mainly focused on the following topics: multi-hazard vulnerability of reinforced concrete and masonry structures; innovative structural retrofitting with composite materials; soil-structure interaction; structural robustness; structural health monitoring of existing structures; and risk and resilience of civil infrastructure to natural and man-made hazards. Since 2018, he is expert reviewer of the Italian Ministry for University and Research.

He authored over 150 papers in peer-reviewed journals and conference proceedings, 1 book, 12 book chapters, 33 reports, and 3 computer tools for seismic analysis of masonry buildings and experimental data selection of masonry properties. He edited 2 books and is guest editor of 4 journal special issues (2 ongoing).

His research outcomes received the following awards and recognitions: Young researcher award by Macedonian Association for Earthquake Engineering in the framework of the 14th European Conference on Earthquake Engineering (2010); 2 articles among the most cited papers in Engineering Structures (2019, 2020); 1 article among the most cited papers in ASCE Journal of Performance of Constructed Facilities (2018); 1 article among the most cited papers in Engineering Failure Analysis (2017); article “Learning from construction failures due to the 2009 L’Aquila, Italy, earthquake”



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among the best 2010 papers of Journal of Performance of Constructed Facilities (2011). Some studies authored by Fulvio Parisi were implemented or cited in guidelines published by the American Concrete Institute (ACI) and CNR. He was a scientific or organizing committee member of more than 15 international conferences, and coordinator or member of working groups in several associations and standard bodies, such as Fédération Internationale du Béton (fib), CNR, Comité Européen de Normalisation (CEN), and Ente Nazionale di Normazione (UNI). In 2019, he founded the spin-off company FORENSICS srl (FORensic ENgineering ServICes), where he is Head of Civil and Risk Engineering services. In 2020, he was included in the list of World's Top 2% Scientists according to the scientific impact of his research activity in 2019. In 2021, this recognition was confirmed, including Dr. Parisi in the list of World's Top Scientists for both career-long and single-year impacts.

2. PhD students of whom the undersigned has been a tutor in the last three years

n. 3	Martina Scalvenzi (34th cycle, ministerial grant, graduated in 2022)
	Giacomo Miluccio (35th cycle, grant funded by research project)
	Valentina Buonocunto (37th cycle, ministerial grant)

3. Topic of the proposed research

Multi-hazard assessment and retrofitting of existing bridges for enhanced robustness

4. Field of study

Geotechnical Engineering ☐

Structural Engineering ☒

Seismic Risk ☐



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5. Summary of the research project (max 500 words. State of the art, short program planned for the activities, etc.)

The protection of civil infrastructure against multiple hazards is a key issue to mitigate socio-economic losses due to future harmful events, ensuring sustainability and resilience of our society, as pointed out by the 2020 “Making Critical Infrastructure Resilient” report by the United Nations Office for Disaster Risk Reduction. Bridges are a key asset of transportation infrastructure, which needs to be properly maintained over time to meet current performance objectives including life safety and collapse prevention. This complex goal is undermined by several factors, such as bridge location in multi-hazard environments, growing intensity of traffic loads, impact of climate change, limited knowledge and deterioration of existing infrastructure. It should also be noted that a large percentage of existing bridges have already attained or even exceeded their nominal service life, because many of them were built starting from the 1960s that were an extraordinary time for construction of freeways in many countries. Another critical issue is the lack of structural robustness in several types of bridges, including beam-type and arch bridges that are a major part of the existing bridge infrastructure. As a result, many bridges often suffer progressive collapse, namely a partial or total collapse due to failure of a single or few components, producing huge consequences (e.g. loss of life, economic losses, functionality loss of transportation infrastructure).

This research project has the following goals: (1) a multi-hazard risk assessment of existing bridges, considering the impact of their out-of-service or collapse on the transportation infrastructure network at territorial scale; (2) the nonlinear structural analysis of bridges through computational strategies with multiple levels of sophistication, moving from simplified to sophisticated methods enabling the assessment of robustness; and (3) the assessment of innovative retrofitting solutions for robustness enhancement. These goals will be pursued through a theoretical-experimental workplan that, starting from data collection on real bridges and past accidents, will move across hazard and vulnerability modelling, advanced simulation, static and dynamic testing on bridge components (piers, girders, bearings) and decks, design and experimental assessment of retrofitting solutions, and validation on real bridges.

6. Research publications

- Miluccio G., Losanno D., Parisi F., Cosenza E. (2022). Fragility analysis of existing prestressed concrete bridges under traffic loads according to new Italian guidelines. *Structural Concrete*, <https://doi.org/10.1002/suco.202200158>.
- Feng D.-C., Zhang M.-X., Brunesi E., Parisi F., Yu J., Zhou Z. (2022). Investigation of 3D effects on dynamic progressive collapse resistance of RC structures considering slabs and infill walls. *Journal of Building Engineering*, 54: 104421.



DEPARTMENT OF STRUCTURES FOR ENGINEERING AND ARCHITECTURE
PHD PROGRAM IN
STRUCTURAL, GEOTECHNICAL ENGINEERING AND SEISMIC RISK

- Miluccio G., Losanno D., Parisi F., Cosenza E. (2021). Traffic-load fragility models for prestressed concrete girder decks of existing Italian highway bridges. *Engineering Structures*, 249: 113367.
- Feng D.-C., Shi H.-R., Parisi F., Brunesi E., Wang C.-L. (2021). Efficient numerical model for progressive collapse analysis of prestressed concrete frame structures. *Engineering Failure Analysis*, 129: 105683.
- Feng D.-C., Xiong C.-Z., Brunesi E., Parisi F., Wu G. (2021). Numerical simulation and parametric analysis of precast concrete beam-slab assembly based on layered shell elements. *Buildings*, 11(1): 7.
- Mucedero G., Brunesi E., Parisi F. (2020). Nonlinear material modelling for fibre-based progressive collapse analysis of RC framed buildings. *Engineering Failure Analysis*, 118: 104901.
- Adam J., Parisi F., Sagaseta J., Lu X. (2018). Research and practice on progressive collapse and robustness of building structures in the 21st century. *Engineering Structures*, 173:122-149.
- Bozza A., Asprone D., Parisi F., Manfredi G. (2017). Alternative resilience indices for city ecosystems subjected to natural hazards. *Computer-Aided Civil and Infrastructure Engineering*, 32(7):527-545.
- De Biagi V., Parisi F., Asprone D., Chiaia B., Manfredi G. (2017). Collapse resistance assessment through the implementation of progressive damage in finite element codes. *Engineering Structures*, 136:523-534.
- Brunesi E., Nascimbene R., Parisi F., Augenti N. (2015). Progressive collapse fragility of reinforced concrete framed structures through incremental dynamic analysis. *Engineering Structures*, 104:65-79.

7. Funded research projects in which the proposed research fits

The research activity is connected to a number of numerical investigations and experimental tests, which are underway within the national research project PRIN FIRMITAS “multi-hazard assessment, control and retrofit of bridges for enhanced Robustness using sMart IndusTriAlized Solutions” funded by the Italian Ministry for University and Research.

8. Funds available for research grants, equipment, missions, etc.

The research activity will mainly consist of numerical research, which is supported by the above-mentioned research project. Such a project also provides funding for



DEPARTMENT OF STRUCTURES FOR ENGINEERING AND ARCHITECTURE
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equipment and participation in meetings, workshops, and conferences.

9. Information related to the research period abroad (min. 3 months) provided for the PhD student (max 300 words)

The PhD student is expected to spend at least 4 months in a foreign research institution, such as:


- University College London (UK) under supervision of Prof. Dina D'Ayala (d.dayala@ucl.ac.uk), who is Professor of Structural Engineering in the Department of Civil, Environmental and Geomatic Engineering, Co-Director of the Earthquake and People Interaction Centre (EPICentre), and Director of the International Association for Earthquake Engineering (IAEE), with long experience on multi-hazard assessment, strengthening, preservation and resilience of civil infrastructure.
- University of Porto (Portugal) under supervision of Prof. Humberto Varum (hvarum@fe.up.pt), who is Professor of Structural Engineering with expertise in experimental testing, nonlinear response analysis, and innovative retrofitting of building structures.
- Universitat Politècnica de València (Spain) in cooperation with Prof. Jose M. Adam (joamar@upv.es), who is Professor of Structural Engineering with expertise in both numerical simulation and experimental testing of existing structures for engineering failure analysis and robustness assessment.

10. Collaborations with companies on the research topic (if available) (max 300 words)

The research activity will be carried out in cooperation with several companies that work on design, assessment and management of bridges, such as ARUP, ANAS or SIS.

Napoli, 07/20/2022

SIGNATURE



This form must be filled and sent to the e-mail address phd.dist@unina.it by 07/20/2022.