

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"



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

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	
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 risk-based design and assessment of offshore wind energy farms

4. Field of study

Geotechnical Engineering

Structural Engineering

Seismic Risk \Box



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

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

In 2015, the United Nations adopted the Sustainable Development Goals (also known as the Global Goals), which promote renewable energy sources (particularly solar, wind and thermal power) and technology innovation for clean, efficient and resilient infrastructure all around the world. Technological progress has also major importance to find optimal solutions to social, economic and environmental challenges. Despite the consolidated technology of onshore wind turbines, offshore wind energy is experiencing rapid development as an attractive renewable energy source, allowing the generation of electricity through wind farms located in bodies of water (usually at sea). Given the occurrence of higher wind speeds offshore than on land, several major plans to build offshore wind farms (OWFs) worldwide were strongly motivated by the chance to generate more electricity per amount of capacity installed compared to onshore wind farms (i.e. capacity factor). Furthermore, OWFs appear to be also less controversial than their onshore counterparts, because of lower impact on people and the landscape. In this respect, it should be noted that - opposed to the typical use of the term "offshore" in the marine industry – OWFs include those installed on inshore water areas such as lakes and fjords in addition to both sheltered coastal areas and deeper-water areas. Most of OWFs have fixed-foundation wind turbines in relatively shallow water, so a big challenge is to build floating wind turbines for deeper water that are still in their early stage of design, development and deployment.

This research project will deal with structural design and assessment of offshore wind turbines (OWTs), accounting for natural, technological and natural-technological (NaTech) hazards through a multi-hazard probabilistic framework. Optimal design solutions will be identified, assuming a joint primary objective of disaster risk minimization and energy efficiency maximization. Natural hazards will be investigated by considering site-specific wind and wave conditions that are expected to be encountered during the life of the structure. Technological hazards will include major events that can produce huge consequences, such as fire, blast, and impact. A probabilistic framework for design and assessment of OWTs against multiple hazards will be developed, evaluating the structural performance of wind turbines with both simplified and advanced response analysis methods. The research activity will also include the interaction with experts working in a variety of science and technology domains (e.g. environment, geosciences, oceanography, weather, hydraulics, economy, metrology, dynamic control). A number of deep-water areas will be selected for pilot studies regarding the installation of OWTs, including one or more areas in the south of Italy. The research project is expected to have high impact on the selection of optimal areas for OWFs as well as their risk-informed design and management.



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

6. Research publications

- Galasso C., Pregnolato M., Parisi F. (2021). A model taxonomy for flood fragility and vulnerability assessment of buildings. International Journal of Disaster Risk Reduction, 53: 101985.
- Russo P., De Marco A., Parisi F. (2020). Assessment of the damage of hydrogen pipelines explosions on people and buildings. Energies, 13(9): 5051.
- Russo P., De Marco A., Parisi F. (2019). Failure of reinforced concrete and tuff stone masonry buildings as consequence of hydrogen pipeline explosions. International Journal of Hydrogen Energy, 44(38): 21067-21079.
- Parisi F., Augenti N. (2017). Structural failure investigations through probabilistic nonlinear finite element analysis: Methodology and application. Engineering Failure Analysis, 80: 386-402.
- 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.
- Russo P., Parisi F. (2016). Risk-targeted safety distance of reinforced concrete buildings from natural-gas transmission pipelines. Reliability Engineering and System Safety, 148: 57-66.
- Augenti N., Nanni A., Parisi F. (2013). Construction failures and innovative retrofitting. Buildings, 3(1): 100-121.
- Augenti N., Parisi F. (2013). Buckling analysis of a long-span roof structure collapsed during construction. Journal of Performance of Constructed Facilities, 27(1): 1-12.

7. Funded research projects in which the proposed research fits

The research activity can be supported by a number of ongoing research projects, even though other projects could be funded on the topic.

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

The research activity will mainly consist of numerical studies, which are supported by the several research projects that provide funding for equipment and participation in meetings, workshops, and conferences.



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

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. Carmine Galasso (c.galasso@ucl.ac.uk) who is Professor of Catastrophe Risk Engineering with expertise in catastrophe risk modeling and disaster risk reduction of civil infrastructure exposed to multiple natural hazards, including earthquakes, strong wind, and flooding.

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

The research activity will be carried out in cooperation with Ten Project s.r.l., which received several awards as innovative enterprise. Ten Project provides engineering services for renewable-energy power plants, particularly wind turbines and photovoltaic systems.

According to an agreement between the University of Naples Federico II and Ten Project s.r.l., which co-funded a PhD grant together with the Italian Ministry of University and Research (as per D.M. n. 352/2022), the PhD student will spend 18 months to work with the above-mentioned company.

Napoli, 07/20/2022

SIGNATURE

File Canol

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