



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

CYCLE XXXIX

The undersigned prof. Beatrice Faggiano

(Full ☐ Associate X Researcher ☐) Department of Structures for
Engineering and Architecture, S.S.D. ICAR/09 Structural Engineering

ASKS

to be included in the list of tutors for cycle XXXIX.

1. Curriculum vitae (max 500 words)

Beatrice Faggiano

ACADEMIC CAREER:

2001 Doctoral degree in Structural engineering at UNINA.

Since 2005 Assistant professor in Structural Engineering.

Since 2013 Qualified as Associate professor in Structural Engineering.

2021 Associate professor in Structural Engineering.

- Teaching posts in national and international II level masters in the domains of Metallic Structures, Timber constructions, Glass Engineering.
- Tutor for more than 90 degree theses, 9 PhD theses and 8 visiting foreign students.
- Responsible of 8 Erasmus bilateral agreements with European universities.

RESEARCH ACTIVITY:

- Research areas: Structural Engineering, Submerged Floating Tunnel, steel, timber structures, Earthquake engineering, vulnerability of historical and monumental buildings against exceptional actions.
- Author of more than 275 papers in national and international journals, conference proceedings, technical documents, monographs.

OTHER ACHIEVEMENTS:

- Tutor inside the Professor Council of the PhD Course DISGERS at UNINA;
Member of: professor councils for the II level master courses in the domain of civil engineering, the Erasmus Commission for DiSt; CNR, Committees for design, construction and testing of timber structures and for elements made of glass; IIWC
– Italian ICOMOS Wood Committee; the Intern. Associations for Bridge Maintenance and Safety (IABMAS) and for Life Cycle Civil Engineering (IALCCE); Fib, Task Group 1.2 Concrete Structures in marine environment., WP



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

1.2.4 'Submerged/floating bridges in seismic areas'.

- Member of organizing and scientific committees of International Conferences, also co-editor of proceedings; Behaviour of Steel Structures in Seismic Areas STESSA; Earthquake Protection of Historical Buildings by Reversible Mixed Technologies PROHITECH; COST Action C26 Urban Habitat Constructions under Catastrophic Events; Steel and Composite Structures EUROSTEEL; SHATIS Structural health assessment of timber structures; SUFTUS Submerged Floating Tunnels and Underwater Tunnel Structures; WCTE World Conference on Timber Structures.
- Organizer and chairman of special sessions and minisimposia, on submerged floating tunnels (9th Intern. Conf. on Bridge Maintenance, Safety and Management, IABMAS 2018, 2020; 2022, 2024, 14th Intern. Conf. on Vibration Problems, ICOVP 2019), as well as on timber structures (SHATIS'19, XIX Convegno ANIDIS 2022 - L'ingegneria sismica in Italia; WCTE2023, IALCCE2023 8th Intern. Symposium on Life-Cycle Civil Engineering).
- Responsible (with prof. Raffaele Landolfo) of the international trilateral agreement for Cooperation, in the field of Structural Engineering and in particular of Submerged Floating Tunnel, among Korea Advanced Institute of Science and Technology (Research Center for Smart Submerged Floating Infrastructural Systems), Zhejiang University (Research Center for Submerged Floating Tunnel) and the University of Naples, Federico II (Dist).
- Participant to national and international research projects, also as research responsible.
- Participant to national and international conferences as speaker, chairman and invited lecturer.
- Lecturer within national and international specialized courses.
- Referee for national and international journals, research projects and conference proceedings.

EXHIBITION

05/2017 Engineering: Archimedes Bridge, a submerged floating tunnel. TDW2017 Tianjin International Design Week 2017: The future is now. Beijing cultural creative center, Italian Pavilion.

AWARD

2018 Wibe Prize - best ranked 30 Papers among 200. Paper title The submerged floating tunnel: a new frontier for strait crossings, B. Faggiano, G. Iovane, R. Landolfo, F. M. Mazzolani

Raffaele Landolfo

ACCADEMIC CAREER



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

Since 2003 Full Professor in Structural Engineering at the University of Naples Federico II.

Main academic roles: among others, member of the Academic Senate, delegate of the rector to real estate, delegate of the dean of the School of Polytechnic and Basic Science, member of the Architecture faculty board, coordinator of the PhD course in “Design, retrofitting and control of both conventional and innovative structures” at the University of Chieti Pescara, head of the Department of Constructions and Mathematic Methods in Architecture, head of the Department of Structures for Engineering and Architecture.

RESEARCH ACTIVITY:

- Main research areas: steel structures and seismic engineering.
- Author of more than 600 papers in national and international journals, conference proceedings, technical documents, monographs, books.

OTHER ACHIEVEMENTS:

- Since 2007 Chair of the technical committee TC13 – Seismic design within ECCS.
- 2014 – 2015 Chair of the ECCS (European Convention for Constructional Steelwork).
- Since 2015 Convenor of the Working Group 2 (WG2) – Steel and Composite Structures for the committee CEN/TC250/SC8 of Eurocode 8.
- Member of the Project Team 2 of CEN/TC250/SC8 for the review of EC8 Chapter on steel structures.
- Participation to other committees CEN/TC 250/SC3, CEN/TC 250/SC9, etc..
- Participation as expert to the board for the national standard for constructions NTC2018.
- Member of the CNR Committee for Structural robustness.
- Italian coordinator of the Erasmus Mundus Master "Sustainable Constructions under Natural Hazards and Catastrophic Events".
- Responsible of several national and international research projects (i.e. HSS-SERF, DI-STEEL, ELISSA, LSV3, DUAREM, EQUALJOINTS, FREEDAM, INNOSEIS, SBRI+, EQUALJOINTS-Plus, etc).
- Invited lecturer in several international universities.
- Participant to national and international conferences as speaker, chairman and invited lecturer
- Editor and member of editorial boards of several scientific journals.
- International patent (in cooperation) for an innovative steel beam-to-column joint.

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



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

years	
n. 1	Beatrice Faggiano <i>Dante Marranzini (XXXVI cycle)</i> <i>type of scholarship: none</i>
n. 4	Raffaele Landolfo <i>Massimo Cicia (XXXVIII cycle)</i> <i>type of scholarship: university funds</i> <i>Massimino Gnazio (XXXVIII cycle)</i> <i>type of scholarship: university funds</i> <i>Shayan Safaei (XXXVII cycle)</i> <i>type of scholarship: university funds</i> <i>Alessandro Prota (XXXVII cycle)</i> <i>type of scholarship: university funds</i>

3. Title of the proposed research
Structural design and health monitoring of Submerged Floating Tunnels for waterway crossings

4. Field of study
Geotechnical Engineering ☐ Structural Engineering ☒ Seismic Risk ☐

5. Type of Scholarship for the project proposal
Ateneo ☐ DM 117 (Investimento 3.3) ☒ SAIPEM S.p.A. <i>(in questo caso indicare l'azienda co-finanziatrice)</i> DM 118 (Investimento 4.1 P.A.) ☐ DM 118 (Investimento 4.1 generici) ☐ DM 118 (Investimento 4.1 Patrimonio culturale) ☐

6. Summary of the research project (max 500 words. State of the art, short program planned for the activities, etc.)
Waterway crossings have always pushed a country socio-economic growth. A step towards the sustainable development of transportation infrastructures is



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

constituted by the Submerged Floating Tunnel (SFT): a tube, submerged at a fixed depth, kept in position through anchorage systems. It evidently meets the H2020 priorities related to societal challenges of smart, green and integrated transport. In fact it is characterized by no visual environmental impact, lower either energy consumption, or air pollution, or land occupation, or noise, as respect to common tunnels and bridges. Moreover, it being a modular structure, SFT is a suitable solution for long span crossings. No SFT has been built yet, however several SFT feasibility and research studies are carried out worldwide since the first idea (A. Grant, 1969, Messina strait, Italy). Main focus concerns concept, structural and technological features and dynamic structural behavior against environmental loads. Major outcome is the design of a 100m prototype (not yet built) for the Qiandao Lake in China, by SIJLAB (Sino-Italian Joint Laboratory of Archimedes' Bridge, 2005-2007). At present the attention to SFT from the international scientific and stakeholder communities is very high. A last example is the recent design by the Norwegian Public Road Administration of a SFT for the E39 cross fjord highway under construction.

In this context, the research objective is the evaluation of the technical feasibility of SFTs for waterway crossings, leading to the preparation of guidelines related to both structural design and health monitoring. This is a topical issue for the development of the new technology.

The project can be articulated in the following main tasks:

1. State of the art: comprehensive literature review, to fix the bases for the development of the studies and the definition of the general methodology.
2. Structural conception and design of case studies: innovative materials for underwater applications, tunnel cross sections; tunnel supporting systems; foundations, connections between the tunnel units, shore connections; definition of peculiar loads on SFT; structural design at different scale corresponding to different destination of use.
3. Structural performance evaluation: type of analysis; identification of performance indicators; parametric analysis of the structural behaviour on case studies; structural performance evaluation against service and ordinary environmental loads; analysis of the robustness against accidental loads, both natural (like seism or tsunami) and manmade (like explosions and impacts) hazards.
4. Safety and monitoring systems: development of adequate safety systems and conception of opportune monitoring systems, also integrating new remote-control innovative technologies that implements augmented and/or virtual reality.
5. Definition of criteria for structural design and health monitoring
6. Preparation of guidelines for the structural design and health monitoring of SFT

The study can include also experimental tests on materials, structural systems and new monitoring technologies, to be decided within the shared activity with the partners of the international trilateral agreement with Korea Advanced Institute of Science and



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

Technology (Research Center for Smart Submerged Floating Infrastructural Systems) and Zhejiang University (Research Center for Submerged Floating Tunnel).
Publication in international conferences and indexed journals are planned.

7. Research publications

- 2023 Palma V., Iovane G., Hwang S., Mazzolani F.M., Landolfo R., Sohn H., Faggiano B.. Innovative Technologies for Structural Health Monitoring of SFTs: Proposal of combination of InfraRed Thermography with Mixed Reality. Journal of Civil Structural Health Monitoring, Special Issue Recent Advances in Quality Control of Bridges and Structures, Springer. <https://doi.org/10.1007/s13349-023-00698-1>.
- 2022 Iovane G., Begovic E., Bilotta E., Faggiano B., Landolfo R., Mazzolani F.M.. Overview of experimental tests on SFT small scale specimen. In: In: Bridge Safety, Maintenance, Management, Life-Cycle, Resilience and Sustainability – (IABMAS 2022), Casas, Frangopol & Turmo (eds) © 2022 copyright the Author(s), ISBN 978-1-032-35623-5, pg. 1161-1169, 11-17 Luglio 2022, Technical University of Catalunya (UPC), Barcelona, Spain. DOI: 10.1201/9781003322641-140
- 2022 Chiesa G., Faggiano B., Landolfo R., Mazzolani F.M., Martinelli L., Mulas M. G., Perotti F.. Saipem's Submerged Floating Tunnel Concept – An Industry and University Cooperation to Drive Innovation in Civil Infrastructures. In: Bridge Safety, Maintenance, Management, Life-Cycle, Resilience and Sustainability – (IABMAS 2022), Casas, Frangopol & Turmo (eds) © 2022 copyright the Author(s), ISBN 978-1-032-35623-5, pg. 1178-1186, 11-17 Luglio 2022, Technical University of Catalunya (UPC), Barcelona, Spain. DOI: 10.1201/9781003322641-142
- 2020 Faggiano B., Iovane G., Toscano I. M., Mazzolani F. M. and Landolfo R. 2020. Preliminary study on the behaviour of the SFT Qiandao prototype against explosions and impacts. Proceedings of the 14th International Conference on Vibration Problems (ICOVP 2019), 1-4september, Crete, Greece, E. J. Sapountzakis et al. (eds.), Lecture Notes in Mechanical Engineering, SPRINGER NATURE Singapore Pte Ltd. 2021 https://doi.org/10.1007/978-981-15-8049-9_50
- 2018 Jiang B., Liang B., Faggiano B., Iovane G., Mazzolani F. M.. Feasibility Study on a Submerged Floating Tunnel for the Qiongzhou Strait in China. Proceedings of the 9th International Conference on Maintenance, Safety, Risk, Management and Life-Cycle Performance of Bridges (IABMAS 2018), 9-13 July, Powers, Frangopol, Al-Mahaidi & Caprani Eds, © 2018 Taylor & Francis Group, London, ISBN 978-1-138-73045-8, pp. 865-871.
- 2016 Mandara A., Russo E., Faggiano B., Mazzolani F.M.. Analysis of fluid-structure interaction for a submerged floating tunnel. In PROCEDIA ENGINEERING, Volume 166, 2016, Pages 397–404, Proceedings of International Symposium on Submerged Floating Tunnels and Underwater Tunnel Structures (SUFTUS-2016), doi: 10.1016/j.proeng.2016.11.572
- 2016 Faggiano B., Panduro J., Mendoza Rosas M. T., Mazzolani F.M.. The conceptual design of a roadway SFT in Baja California, Mexico. In PROCEDIA ENGINEERING, Volume 166, 2016, Pages 3–12, Proceedings of International Symposium on Submerged Floating Tunnels and Underwater Tunnel Structures (SUFTUS-2016), doi: 10.1016/j.proeng.2016.11.530.
- 2012 Martire G., Faggiano B., Mazzolani F. M., Zollo A., Stabile T.A. (2012). A comprehensive study on the performance of Submerged Floating Tunnels during severe seismic events. In: F.M. Mazzolani, R. Herrera. Behaviour of Steel Structures in Seismic Areas. p. 523-529, London: CRC Press Taylor & Francis Group, ISBN: 9780415621052.
- 2008 Mazzolani F.M., Landolfo R., Faggiano B., Esposto M., Perotti F., Barbella G. (2008). Structural



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

analyses of the Submerged Floating Tunnel prototype in Qiandao Lake (P.R. of China). ADVANCES IN STRUCTURAL ENGINEERING, vol. 11, p. 439-454, ISSN: 1369-4332, doi: 10.1260/136943308785836862.

2007 Mazzolani F.M., Landolfo R., Faggiano B., Esposto M. (2007). A submerged floating tunnel (Archimedes bridge) prototype in the Qiandao Lake (P.R. of China): research development and basic design. COSTRUZIONI METALLICHE, vol. 6, p. 45-63, ISSN: 0010-9673

8. Funded research projects in which the proposed research fits

The topic is presently developed within the following international trilateral agreement (2018-2023): Agreement for Co-Operation, in the field of Structural Engineering and in particular in the field of Submerged Floating Tunnel, among Korea Advanced Institute of Science and Technology (Research Center for Smart Submerged Floating Infrastructural Systems), Zhejiang University (Research Center for Submerged Floating Tunnel) and the University of Naples, Federico II (Department of Structures for Engineering and Architecture).

The establishment of an international consortium, founded by the partners of the trilateral agreement plus the Norwegian Public Road Administration, is ongoing.

A cooperation agreement with SAIPEM is also ongoing.

In April 2021 the project SubFloat funded by FRA2020 (University research funds) is started (corresponding proponent B. Faggiano, DiSt; partners E. Begovic, DII, E. Bilotta, DICEA). It has been extended to 2024, due to Covid.

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

In the context of the international agreement, funding opportunities are available for study periods in the partners institutions, specifically South Korea and China, where extensive research activities including experimental campaign are ongoing on topics relevant to the SFT structure, such as structural behavior, design criteria, constructional details, new materials, monitoring, construction methods.

The project SubFloat is funded with 40000€ in two years.

Funding opportunities can arise also within the cooperation agreement with SAIPEM.

10. Information related to the research period abroad (min. 3 months) provided for the PhD student (please indicate University/research institution and professor/researcher of reference) (max 300 words)

Study periods at the international agreement partner institutions, specifically South Korea, Korea Advanced Institute of Science and Technology (Research Center for Smart Submerged Floating Infrastructural Systems, chaired by prof. HK Lee) and China, Zhejiang University (Research Center for Submerged Floating Tunnel, chaired by prof. Y. Xiang), should be planned.



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

Opportunities can arise also through the cooperation with the Norwegian Public Road Administration.

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

The establishing international consortium contemplates in the bylaw also the association of companies, institutions, research centers, interested to the development of the innovative technology.

The cooperation agreement with SAIPEM is a present opportunity.

Naples, 29 June 2023

SIGNATURE

Beatrice Figliano

Il presente modulo va compilato in ogni sua parte ed inviato all'indirizzo di posta elettronica phd.dist@unina.it entro e non oltre il 30/06/2023.