

UNIVERSITY OF NAPLES FEDERICO II



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

CYCLE XXXVII

The undersigned prof. ANTONIO BILOTTA

(Full ☐ Associate ☐ Researcher ☒) Department of _____

Structures for Engineering and Architecture

S.S.D. (*write code and full name* ICAR09 – Structural Engineering)

ASKS

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

1. Curriculum vitae (max 500 words)

Antonio Bilotta, PhD, is Assistant Professor of Structural Engineering at the University of Naples Federico II, Italy. His research interests include:

- Strengthening of existing reinforced concrete structures by application of fiber-reinforced composite materials: on this issue an extensive experimental programme was personally carried out and the contribution for a statistical procedure for the calibration of capacity models from experimental data was implemented, in accordance with the suggestions provided by Eurocode 0. The application of the procedure allowed formulating a proposal for updating the design formulas of the Instructions CNR-DT200/2004. The proposal was now in the updated standard CNR-DT200-R1/2013. Moreover, with reference to the adhesion of FRP bars applied according to the technique NSM (near surface mounted) an extensive experimental programme of bond tests has been performed in the framework of the research project EN-CORE (Marie Curie research training network) - fib TG 9.3 (international federation for structural concrete - task group 9.3).
- Effects of fire on concrete structures reinforced with FRP bars: on this issue the writer collaborated for an activity concerning the effects of high temperatures on the performance of concrete members reinforced with FRP bars continued in cooperation with the Research Institute for Infrastructure and Environment of the University of Edinburgh (BRE - Centre for Fire Safety Engineering) where the writer has been Visiting Researcher.
- Behaviour of intumescent paints for fire protection of steel structures: on this issue, he is performing theoretical and experimental activities to assess thermal properties of intumescent coatings, which are necessary for calculations with advanced methods.
- Composite steel and concrete structures: on this issue the writer is secretary of the Task Group 2.6 of the fib (fédération internationale du béton / the International Federation for Structural Concrete), which is aimed to contribute to an unified approach for the design of steel, concrete and composite members.



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PHD PROGRAM IN
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- Effects of earthquake on structures: this theme the writer carried out reconnaissance activities following the recent earthquakes in Italy since 2009, and numerical analyses for the assessment of vulnerability and the design of the strengthening of existing structures.

The writer is author of more than 100 publication (about 30 on international peer reviewed journal)
The writer participated to several national (more than 10) and international (more than 20) conferences, generally as speaker.

The writer participated to several national (more than 20) and international research projects, among which: RELUIS DPC 2005-2008, SIMURAI, RELUIS DPC 2010-2013, RELUIS DPC 2014-2018, RELUIS DPC 2019-2021, METRICS, METROPOLIS, GRISIS, RiqualiFire, CoIn, CERN.

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

n. <u>4</u>	<i>specify the type of scholarship: university funds, PON, POR, etc.</i> Dr. Donatella de Silva Research topic: Fire protection for steel structures (from 2014 to 2017 – Thesis dissertation in January 2018) in co-tutoring with Prof. Emidio Nigro – university funds Thesis title: Experimental investigation and numerical simulations on steel elements protected with intumescent coating. Dr. Alberto Compagnone Research topic: Fire resistant structures (from 2016 to 2019 - Thesis dissertation in March 2020) in co-tutoring with Prof. Emidio Nigro – university funds Thesis title: Probabilistic approach for simplified verification methods of resistance of steel frames in fire. Eng. Giusiana Testa Research topic: Safety assessment of existing bridges (from 2019 to date - Thesis dissertation expected in 2023) in co-tutoring with Prof. Iunio Iervolino – university funds Arch. Ugo Carmando Research topic: Application of artificial intelligence (AI) for structural monitoring systems for infrastructure (from 2020 to date - Thesis dissertation expected in 2024) funded by PON R&I 2014-2020
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3. Title of the proposed research
Structural monitoring systems for infrastructures

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

5. Summary of the research project (max 500 words. State of the art, short program planned for the activities, etc.)
Advanced numerical modelling of the structures can increase the reliability of the results of the safety analyses and reduce the values of some partial safety factor that limit the expected performance of the structures. Furthermore, they allow to identify boundary conditions (e.g., constraints) different from those assumed in the design. With reference to existing structures, the possibility of having experimental measurements can be fundamental. Static loading tests and dynamic tests offers a certainly convenient solution for appropriate numerical processing of the experimental data. Furthermore, the process of structural identification by dynamic tests, is an important basis for the design of a monitoring system. Finally, to characterize materials mechanical properties used in the numerical models, robotic drones able to reach easily hidden areas of the structure can be used. The research project foresees the application to some case studies of sensors for the dynamic identification of structures and their health monitoring through traditional approaches of model updating and approaches based on machine learning. For the investigation of existing structures, the use of the above-mentioned robotic drones is expected.



DEPARTMENT OF STRUCTURES FOR ENGINEERING AND ARCHITECTURE
PHD PROGRAM IN
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6. Research publications

Beyond preliminary not published studies conducted on this issue during the last year (five MSc Thesis), the following publications are related to bridges or measurement with innovative technologies.

F. Ceroni, M. Pecce, A. **Bilotta**, E. Nigro (2014). Strain assessment for the design of NSM FRP systems for the strengthening of RC members. Construction and building materials

A. **Bilotta**, F. Ceroni, E. Nigro, M. Pecce, (2015). Efficiency of CFRP NSM strips and EBR plates for flexural strengthening of RC beams and loading pattern influence. Composite structures

Del Prete I., **Bilotta** A., Nigro E. (2015). Performances at high temperature of RC bridge decks strengthened with EBR-FRP. Composites Part b, Engineering

Bilotta, A., Ceroni, F., Lignola, G.P., Prota, A., (2017). Use of DIC technique for investigating the behaviour of FRCM materials for strengthening masonry elements. Composites Part b, Engineering

A. **Bilotta**, G. Testa, C. Capuano, E. Chioccarelli (2021) Machine learning approach for damage detection in railway bridge: preliminary application. CSHM8 - 8th Workshop on Civil Structural Health Monitoring. Naples Italy. 8pp

G. Testa, A. **Bilotta**, E. Chioccarelli (2021) Optimal sensor placement for dynamic identification of a reinforced concrete bridge. fib Conference 2021. Lisbon Portugal. 9pp.

7. Funded research projects in which the proposed research fits

INSIST – Intelligent monitoring system for urban infrastructure security.

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

Possibility of economic support from incoming research project on the topic.

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9. 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)

The research leader has good research collaboration outside Italy, most notably for this topic:

University of Edinburgh (UK), University of Madrid (Spain), University of Porto (Portugal), University of Thessaloniki (Greece).

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

No collaboration expected at the moment.

Naples, 30.04.2021

SIGNATURE



This form must be filled and sent to the e-mail address phd.dist@unina.it no later than Friday 30/04/2021.