UNIVERSITA' DEGLI STUDI DI NAPOLI FEDERICO II

DIPARTIMENTO DI STRUTTURE PER L'INGEGNERIA E L'ARCHITETTURA
CORSO DI DOTTORATO DI RICERCA IN
INGEGNERIA STRUTTURALE GEOTECNICA E RISCHIO SISMICO

XXXVIII CICLO

Il sottoscritto prof. ANTONIO BILOTTA

(PO □ PA ■ RU □ RTD □) afferente al Dipartimento di Structures for Engineering and Architecture

S.S.D. (ICAR09 – Structural Engineering)

CHIEDE

di essere inserito nell'elenco dei tutor per il XXXVIII ciclo.

1. Curriculum del proponente (max 500 parole)

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.

• 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, RELUIS DPC 2022-2024.

2. Dottorandi dei quali il proponente è stato tutor nell'ultimo triennio

n. _3___	*specificare tipologia di borsa: ateneo, pon, por, ecc.* 1. **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. 2. **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 3. **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

3. Titolo della ricerca proposta

Capacity of reinforced concrete joints

4. Area Tematica

Ingegneria Geotecnica □

Ingegneria Strutturale ■

Rischio Sismico □

5. Sintesi del progetto di ricerca (max 500 parole. Stato dell'arte, breve programma previsto per le attività e obiettivi)

Studies on the behaviour of reinforced concrete joints of frames in seismic areas have been conducted in recent decades especially, and principally following the most recent seismic events, during which the crisis of nodal panels has been recorded more frequently. For the same reason, technical guidelines have paid specific attention to the construction details of joints. The models for calculating the capacity of joints have been designed primarily for cases where beams do not converge on all sides. Recently a model of joint shear capacity based on a traditional mechanical approach (i.e., Mohr's circles), which explicitly considers the presence of single or double beams in the plane of the nodal panel has been developed. The model can be further refined based on both experimental tests and accurate numerical analyses that replicate the joint confinement conditions as realistically as possible. Indeed, for interior joints more refined indications would be useful for real cases where the overlap between beams and columns is only partial (e.g., eccentricity between structural members), or the elements are not orthogonal to each other. Finally, the use of detailing for transverse reinforcement other than stirrups could be investigated in more depth.
The planned activities for this PhD project are both experimental tests on real scale reinforced concrete joints and advanced numerical simulations to extent the outcomes of the experimental tests.

6. Pubblicazioni sul tema di ricerca

Beyond preliminary not published studies conducted on this issue during the last year (five MSc Thesis), the following publications are related to experimental tests (measurement with innovative technologies) and numerical simulations:

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

Bilotta, A., Compagnone, A., Esposito, L., Nigro, E. (2020). Structural behaviour of FRP reinforced concrete slabs in fire. Engineering Structures, 221.

A. **Bilotta**, E. Cosenza (2022). Shear capacity model for reinforced concrete joints. Engineering Structures 266. 114631

7. Progetti di ricerca finanziati in cui l'attività si inserisce

RELUIS DPC 2022-2024

8. Fondi disponibili per eventuali assegni, borse di ricerca, ecc., per acquisto eventuale di attrezzature, missioni

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

9. Informazioni relative ad un periodo di ricerca all'estero (minimo tre mesi) previsto per il dottorando (*indicare Università/ente di ricerca e docente/ricercatore di riferimento*) (max 300 parole)

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. Eventuali collaborazioni con imprese/aziende sul tema di ricerca (max 300 parole)
No collaboration expected at the moment

Napoli,_____ FIRMA

Il presente modulo va compilato in ogni sua parte ed inviato all'indirizzo di posta elettronica phd.dist@unina.it entro e non oltre **mercolerdì 20/07/2022**