



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

XXXVI CICLO

Il sottoscritto prof. _____ Gennaro Magliulo _____

(PO PA RU RTD) afferente al Dipartimento di _____
__Strutture per l'Ingegneria e l'Architettura__ S.S.D. (*indicare codice e nome per
esteso* __Tecnica delle Costruzioni – ICAR09__)

CHIEDE

di essere inserito tra i possibili tutor di studenti di dottorato per il XXXVI ciclo.

1. Curriculum sintetico del proponente (max 500 parole)

Gennaro Magliulo since 2018 is associate professor at the dept. of Structures for Engineering and Architecture at University of Naples Federico II, where he teaches two master degree courses: Precast Structures and Healthcare Facilities. Since 2016 he is affiliate researcher at the Construction Technologies Institute of the National Research Council.

He was graduated in Civil Engineering, branch Structures, in 1997 with laude and got his Ph.D. in Engineering of the Structures in 2001. In 2001 he had a six-month post-doc position at University of Ljubljana, Slovenia, and between 2001 and 2002 he was visiting researcher at Technion in Israel.

He is currently tutor of 3 PhD students, one in the frame of the doctorate in Structural and Geotechnical Engineering and Seismic Risk at the University of Naples Federico II, and two in the frame of the doctorate in Environmental Phenomena and Risks at the University of Naples Parthenope. He has been tutor of further 7 PhD students, six in the frame of the doctorate in Seismic risk at University of Naples Federico II and one in the frame of the doctorate in Engineering of Materials and Structures at the same university. He also taught the course of Seismic Analysis of Buildings within the doctorate in Seismic Risk. He is currently member of the board of doctorate professors of the doctorate in Biology and Applied Sciences at University of Molise. He is author of 6 patents and more than 200 articles, 50 of them published by international peer reviewed journals. His research concerns earthquake engineering and dynamics of structures, nonstructural components, r/c structures and precast



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

structures, in the fields of theoretical modelling, numerical analysis, experimental research and code activity.
 He has been principal investigator of 23 international and national research projects, funded by either public or private entities.
 He is member of the board of ACI Italy Chapter and of "Seismic Performance Of Non-structural Element" association, and member of the fib committee TG 6.17 "Retrofitting and repairing of precast structures in seismic areas". He is also member of ACI, of the European Association of Earthquake Engineering.
 Since 2019 he is in charge of the quality certification of the master course in Structural and Geotechnical Engineering at University of Naples Federico II. In the frame of this master course, he has been tutor of more than 50 internships and more than 80 theses.

2. Dottorandi dei quali il proponente è stato tutor nell'ultimo triennio	
<i>n. _1_</i>	<i>specificare tipologia di borsa: ateneo, pon, por, senza borsa, ecc.</i> <i>_____ senza borsa _____</i>

3. Titolo della ricerca proposta
<u>Collapse assessment and retrofitting of RC precast structures</u>

4. Area tematica
Ingegneria Geotecnica <input type="checkbox"/>
Ingegneria Strutturale <input checked="" type="checkbox"/>
Rischio Sismico <input type="checkbox"/>



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

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

INTRODUCTION AND MOTIVATIONS

Recent earthquakes^{1,2,3,4} showed that RC precast structures may suffer heavy damage or collapse during seismic events. Some specific vulnerabilities were clearly evidenced in RC precast buildings designed without seismic provisions, as beam-to-column, tile-to-beam and panel to structure connections other than poor column behavior. Furthermore, heavy damage was also observed in buildings designed with seismic provisions, mainly in panel-to-structure connections and sometimes in beam-to-column and tile-to-beam connections. In the former case it was related to the minor importance given to the design of nonstructural elements and their connections; in the latter case it was due to the lack of details in code provisions or guidelines. Finally, heavy damage due to earthquakes caused heavy financial losses due to the interruption of industrial activities, some of them essential like the production, storage and distributions of medicines.

The above described vulnerabilities claim studies on the seismic behavior of RC precast structures in terms of: i) precast reinforced concrete and harmonic steel degradation; ii) friction connection modelling and response; iii) panel- and infill-structure connection modelling and response; iv) retrofitting devices able to improve the seismic behavior of the structures without causing the interruption of the functionality of the building.

AIMS AND OBJECTIVES

The project aims at increasing the knowledge on the seismic response of RC precast structures and their retrofitting. This will be accomplished through the following objectives:

- (I) study of the strength degradation of precast reinforced concrete and harmonic steel;
- (II) improvement of the modelling for the seismic response assessment of the friction connections and of the panel- and infill-to-structure connections;
- (III) collapse assessment of existing RC precast structures;
- (IV) development of systems for the seismic retrofitting of precast structures.

WORK PLAN

The activity will be organized in three work packages:



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

- (1)analysis of tests for the evaluation the strength of precast reinforced concrete and harmonic steel in existing precast structures;**
- (2)nonlinear multi-stripe analyses of existing precast structures located in different sites in Italy;**
- (3)development of retrofitting and innovative solutions for the improvement of the seismic performance of RC precast structures.**

REFERENCES

1. Magliulo G, Ercolino M, Petrone C, Coppola O, Manfredi G. Emilia Earthquake: the Seismic Performance of Precast RC Buildings. *Earthquake Spectra* 2014, 30 (2):891-912.
2. Belleri A, Brunesi E, Nascimbene R, Pagani M, Riva P. Seismic performance of precast industrial facilities following major earthquakes in the Italian territory. *Journal of Performance of Constructed Facilities* 2015, 29 (5).
3. Liberatore L, Sorrentino L, Liberatore D, Decanini L.D. Failure of industrial structures induced by the Emilia (Italy) 2012 earthquakes. *Engineering Failure Analysis* 2013, 34:629-647.
4. Faggiano B, Iervolino I, Magliulo G, Manfredi G, Vanzi I. Post-event analysis of industrial structures behavior during L'Aquila earthquake. *Progettazione sismica 2009 (English Special Edition):*203-208.

6. Eventuali pubblicazioni del tutor sul tema di ricerca (max 10)

- **Magliulo G.**, Bellotti D., Cimmino M., Nascimbene R.. Modeling and seismic response analysis of RC precast Italian code-conforming buildings. *Journal of Earthquake Engineering* 2018; 22(S2): 140-167. DOI <https://doi.org/10.1080/13632469.2018.1531093>.
- Ercolino M., Petrone C., **Magliulo G.**, Manfredi G.. Seismic design of single-story precast structures for P- Δ effects. *ACI Structural Journal* 2018; 115 (4): 943-955. DOI 10.14359/51701915.
- Ercolino M., **Magliulo G.**, Manfredi G.. Seismic performance of single-story precast buildings: effect of cladding panels. *Journal of Structural Engineering* 2018; 144(9): 04018134. DOI 10.1061/(ASCE)ST.1943-541X.0002114.
- Ercolino M., Bellotti D., **Magliulo G.**, Nascimbene R.. Vulnerability analysis of industrial RC precast buildings designed according to modern seismic codes. *Engineering Structures* 2018; 158: 67-78; DOI <https://doi.org/10.1016/j.engstruct.2017.12.005>.
- **Magliulo G.**, Cimmino M., Ercolino M., Manfredi G.. Cyclic shear tests on RC precast beam-to-column connections retrofitted with a three-hinged steel device. *Bulletin of Earthquake Engineering* 2017; 15(9): 3797-3817; DOI 10.1007/s10518-017-0114-x.



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

- Ercolino M., **Magliulo G.**, Manfredi G.. Failure of a precast RC building due to Emilia-Romagna earthquakes. *Engineering Structures* 2016; 118: 262-273; DOI <http://dx.doi.org/10.1016/j.engstruct.2016.03.054>.
- **Magliulo G.**, Ercolino M., Cimmino M., Capozzi V., Manfredi G.. Cyclic shear test on a dowel beam-to-column connection of precast buildings. *Earthquake and Structures* 2015; 9(3): 541-562; DOI <http://dx.doi.org/10.12989/eas.2015.9.3.541>.
- **Magliulo G.**, Ercolino M., Manfredi G.. Influence Of Cladding Panels On The First Period Of One-Story Precast Buildings. *Bulletin of Earthquake Engineering* 2015; 13: 1531-1555; DOI 10.1007/s10518-014-9657-2.
- **Magliulo G.**, Ercolino M., Cimmino M., Capozzi V., Manfredi G.. FEM analysis of the strength of RC beam-to-column dowel connections under monotonic actions. *Construction and Building Materials* 2014; 69: 271-284; DOI 10.1016/j.conbuildmat.2014.07.036.
- **Magliulo G.**, Ercolino M., Petrone C., Coppola O., Manfredi G.. Emilia Earthquake: the Seismic Performance of Precast RC Buildings. *Earthquake Spectra* 2014; 30(2): 891-912; DOI 10.1193/091012EQS285M.

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

- Research project titled "Implicit seismic risk of structures in Italy" funded by the Department of Civil Protection (duration 36 months: 01 Jan 2019-31 Dec 2021). National coordinator of the project: prof. Iunio Iervolino. Coordinator of a research unit at University of Naples Federico II: prof. Gennaro Magliulo.

8. Eventuali fondi disponibili a supporto dell'attività del dottorando (escluso finanziamento borse)

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 con indirizzo mail*) (max 300 parole)



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

The student will spend six months at the University of Lubiana (UoL) in Slovenia as a research fellow.

This period will be related to the work package 2, approximately corresponding to the second year of studies. The student will improve the modelling of panel-to-structure connection collaborating with Prof. Tatjana Isakovic and Prof. Matej Fischinger, both academic members of UoL and expert in seismic modelling of RC precast structures.

The collaboration with Prof. Isakovic and Prof. Fischinger will enhance the modelling and simulation skills of the student. She/he will have the opportunity to work on the experimental data provided by two important European projects regarding precast structures and their connections.

During this period, the student will be involved in the research activities promoted by UoL. The research activity at the UoG will be an essential experience for the student in terms of personal, social, and professional life.

10. Eventuali collaborazioni con imprese/aziende sul tema di ricerca (max 300 parole)

The research project is of potential interest of all the companies producing RC precast elements and seismic devices for retrofitting of RC precast structures.

Three companies have already shown their interest for this project: Pre.Mer srl, SEIEFFE prefabbricati spa and FIP MEC srl. Pre.Mer srl, SEIEFFE prefabbricati spa produce RC precast elements and are interested in the seismic assessment of precast structures and in solutions reducing the seismic risk. FIP MEC srl produces devices for the seismic protection of structures and components and is interested in studies related to the retrofitting of RC precast structures.

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

Napoli, __13 Feb 2020__

FIRMA

A handwritten signature in black ink, consisting of a large, stylized initial 'P' followed by a smaller 'A' and a vertical stroke.

Il presente modulo va compilato in ogni sua parte ed inviato all'indirizzo di posta elettronica phd.dist@unina.it entro e non oltre **venerdì 14/02/2020**.