

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

XXXIX CICLO

Il sottoscritto prof. ANTONIO FORMISANO

(PO □ PA ■ RU □ RTD □) afferente al Dipartimento di STRUTTURE

PER L'INGEGNERIA E L'ARCHITETTURA

S.S.D. (ICAR/09 TECNICA DELLE COSTRUZIONI)

CHIEDE

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

1. Curriculum sintetico del proponente (max 500 parole)

Antonio Formisano is Associate Professor of Structural Design at the Department of Structures for Engineering and Architecture of the University of Naples "Federico II". Qualified as Full Professor in 2021, he is lecturer in courses on metal structures and vulnerability and seismic retrofitting of existing buildings within the framework of the International Masters ETeC, Design of Steel Structures in Smart Cities, SUSCOS, ELARCH, ArINT and DYCLAM. His research is mainly focused on the following topics: analysis of steel and aluminium alloy structural systems and connections; seismic vulnerability analysis of masonry buildings, with particular reference to building aggregates in historic centres, and reinforced concrete ones; vulnerability and seismic risk of historic centres; seismic consolidation of existing structures by systems based on the use of metal materials; seismic analysis of coldformed thin walled structures; robustness of steel structures; composite materials made of natural fibres, life cycle assessment and energy requalification of buildings. He is the author of about 500 publications published in national and international journals and books, as well as on national and international conference proceedings, where he participated as speaker and chairman. His records on Scopus are as follows: Documents 251, Citations: 3437, H index: 34 (updated on 23/06/23). He was part of the working group that delivered the technical document CNR-DT 208/2011 on the design of aluminium alloy structures. He was a consultant of UNI for the translation of EuroCode 3 Part 1.8 on the design of steel joints. Currently he is a member of the



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project teams for the development of the new version of Eurocode 9 "Design of aluminium alloy structures" He was member of the editorial and scientific committee of numerous national and international conferences and congresses. He participated and is participating as a member and coordinator of numerous national and international research projects. He is a member of the editorial board and reviewer of numerous national and international journals. He held lectures and seminars at several Universities and National and International Research Centres, as well as training courses at Universities and Professional Orders on European Community marking, design of steel and aluminium structures and connections, seismic vulnerability and retrofitting of existing buildings, study and experimentation on new eco-friendly building materials. He received awards in the fields of Structural Engineering and Green buildings. In particular, he was featured among the World's Top 2% Scientists 2021 and 2022, as published by Stanford University on Plos Biology.

2. Dottorandi dei quali il proponente è stato tutor nell'ultimo triennio	
n3	ANTONIO DAVINO (ATENEO), EMILIA MEGLIO (PON DM 1061) E GIOVANNA LONGOBARDI (ATENEO)

3. Titolo della ricerca proposta

INNOVATIVE BUILDING CONSTRUCTION SYSTEMS MADE OF MODULAR SUBSTRUCTURES

4. Area tematica
Ingegneria Geotecnica D
Ingegneria Strutturale
Rischio Sismico 🗆



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5. Tipologia di borsa per la quale si propone il progetto

Ateneo □

DM 117 (Investimento 3.3) PROGETTO SISMA SRL – Via Marzabotto n.4 - 41042 Fiorano Modenese (MO)

DM 118 (Investimento 4.1 P.A.) □

DM 118 (Investimento 4.1 generici) □ DM 118 (Investimento 4.1 Patrimonio culturale) □

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

The research project to be established within the PhD program is mainly aimed at the development of innovative building construction systems, consisting of modular substructures that can be assembled on site, which (in turn) should be prefabricated in the factory (partially or totally). Once the most suitable building type has been identified, specific research must be carried out in order to launch this system on the building market. The achievement of this macro-objective can be divided into different phases, even overlapping one with each other, which refer to the following activities:

- Bibliographic and market research on the main prefabricated building solutions.
- Identification of the most suitable construction technology and identification of the structural elements composing the modular system.
- Numerical analysis to design the load-bearing elements through specific calculation programs. Non-linear finite element analyses will be performed at different levels, considering cross-section, element, macro-element (if any) and global structure approaches.
- Identification of the most appropriate joining systems among elements. Also in this case, appropriate numerical analysis will be performed. In addition, ad hoc tests will be carried out on prototypes to be tested in the laboratory.
- Study of the most suitable assembly and installation schemes.

The software used will be the most used programs in the freelance profession of structural designer, mainly based on dynamic linear and non-linear static analysis, as well as the more advanced software that allows to investigate the behaviour of the elements at the sectional



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level or of the joints among different parts, even (and above all) in the non-linear field. All the numerical analyses to be performed will be supported both by laboratory analysis and by literature data having proven validity.

7. Eventuali pubblicazioni del tutor sul tema di ricerca (max 10)
Calderoni, B., De Martino, A., Formisano, A., Fiorino, L. (2009). Cold formed steel beams under monotonic and cyclic loading: Experimental investigation. Journal of
Constructional Steel Research, 65 (1), pp. 219-227. DOI: 10.1016/j.jcsr.2008.07.014.
 Davino, A., Longobardi, G., Meglio, E., Dallari, A., Formisano, A. (2022). Seismic Energy Upgrading of an Existing Brick Masonry Building by a Cold-Formed Steel Envelope System. Buildings, 12 (11), art. no. 1918. DOI: 10.3390/buildings12111918
 Faggiano, B., Fiorino, L., Formisano, A., Macillo, V., Castaldo, C., Mazzolani, F.M. (2014). Assessment of the design provisions for steel concentric X bracing frames with reference to Italian and European codes. Open Construction and Building Technology Journal, 8, pp. 208-215, DOI: 10.2174/1874836801408010208
 Faggiano, B., Formisano, A., Castaldo, C., Fiorino, L., Macillo, V., Mazzolani, F.M. (2016). Appraisal of seismic design criteria for concentric bracing steel structures
 according to Italian and European codes. Ingegneria Sismica, 55 (5), pp. 42-50. Faggiano, B., Formisano, A., Fiorino, L., Castaldo, C., Macillo, V., Mazzolani, F.M. (2017). Assessment of the design criteria for concentric V-braced steel structures according to Italian and European codes. Open Civil Engineering Journal, 11 (Suppl-1, M12), pp. 464-474. DOI: 10.2174/1874149501711010464.
Formisano, A., Gamardella, F., Mazzolani, F.M. (2013). Capacity and demand of ductility for shear connections in steel MRF structures. Civil-Comp Proceedings, 102.
Mohebi, B., Yazdanpanah, O., Kazemi, F., Formisano, A. (2021). Seismic damage diagnosis in adjacent steel and RC MRFs considering pounding effects through improved wavelet-based damage-sensitive feature. Journal of Building Engineering, 33, art. no. 101847.DOI: 10.1016/j.jobe.2020.101847.
□ Terracciano, G., Di Lorenzo, G., Formisano, A., Landolfo, R. (2015). Cold-formed thin-walled steel structures as vertical addition and energetic retrofitting systems of existing masonry buildings. European Journal of Environmental and Civil Engineering, 19 (7), pp. 850-866.DOI: 10.1080/19648189.2014.974832.
□ Yazdanpanah, O., Formisano, A., Chang, M., Mohebi, B. (2021). Fragility curves for seismic damage assessment in regular and irregular MRFs using improved



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wavelet-based damage index. Measurement: Journal of the International Measurement Confederation, 182, art. no. 109558. DOI: 10.1016/j.measurement.2021.109558.

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

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

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10. 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)

A minimum of three months will be spent by the PhD student at the University of Zagreb (Croatia) under the tutorage of Professor Davor Skejic, who is working in the field of metal structures. A further research period of at least three months could be spent at the University of Timisoara (Romania) under the guidance of Prof. Marius Mosoarca, who collaborated since many years with me in the field of seismic assessment and retrofit of structures.

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

The partnership with the Progetto Sisma Srl company, which has a consolidated background in manufacturing seismic-energy coating systems of existing buildings, will allow to the PhD student to join together theoretical and practical approaches to implement new prefabricated systems for new constructions.

Napoli, 30/06/2023

FIRMA .