



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

XXXVII CICLO

I sottoscritti prof. prof. Giorgio Serino (PO ■ PA □ RU □ RTD □) e
prof. Fulvio Parisi (PO □ PA □ RU □ RTD ■) afferenti al
Dipartimento di Strutture per l'Ingegneria e l'Architettura S.S.D. ICAR/09 Tecnica delle
Costruzioni

CHIEDONO

di essere inseriti nell'elenco dei tutor per il XXXVII ciclo.

1. Curriculum del proponente

Prof. Giorgio Serino

Academic positions

Full Professor of Structural Engineering and Design (Univ. Naples Federico II: since 11/01), Associate Professor (Third Univ. Rome: 11/98 to 10/01), Assistant Professor (Univ. Naples Federico II: 07/92 to 10/98), Research Assistant (Univ. California Berkeley, USA: 06/88 to 01/89).

Professional status

Registered professional engineer in Italy: 9703 (Albo Ingegneri Napoli); Engineer in Training in California: XE075052 (Board of Registration for Professional Engineers and Land Surveyors).

Honors and awards

Finalist, Philips Morris Prize for Scientific and Technological Research, Italy, 1997
1-year post-doc scholarship, University of Naples Federico II, Naples, Italy, 1991
1-year scholarship, Institute for Applied Mathematics, CNR, Naples, Italy, 1990
Winner of a 1-year grant, Research Ideas Competition, ISMES, Bergamo, Italy, 1990
Fulbright complete travel and study fellowship, Italy/USA, 1987-88
IBM Summer Stage Prize, Novedrate, Italy, 1984

Research experience

Dr. Serino has maintained a balance between academic and practical experience. Dr. Serino is interested in structural dynamics and earthquake engineering, structural testing and innovative control systems. In the past 15 years, he has obtained experience in passive and semi-active structural control systems as the principal investigator of projects sponsored by Italian and European agencies and the private sector (ISMES,



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ENEL). He is an active member in the technical committees of GLIS (Italian Working Group for Seismic Isolation) and ANIDIS (Italian Association of Earthquake Engineering). In 1998, he was elected Member of CUN (Italian National University Council, the consulting organism of the Italian Ministry of Education and Research) for the Civil Engineering and Architecture sector.

Experience as research team coordinator

- Team Leader in an experimental research financed by EU on semi-active control with magnetorehological devices (Euro 200,000, 2000 to 2003)
- Principal Investigator in 3 national research contracts financed by the Italian Ministry of University and Research on wind and earthquake control of structures (Euro 75,000, 1999 to 2003)
- Team Leader in an experimental research financed by EU on semi-active control (Euro 250,000, 1997-98)
- Principal Investigator in 3 research contracts between ENEL and Univ. of Naples on seismic protection of HV equipment (Lit. 140.000.000+VAT, 1994 to 1999)
- Principal Investigator in 2 research contracts between ISMES and Univ. of Naples on passive control of structures (Lit. 120.000.000+VAT, 1992 to 1996)

Prof. Fulvio Parisi

Fulvio Parisi is Assistant Professor (with tenure track) in Structural Engineering at University of Naples Federico II, Italy, and Associate Researcher of the National Research Council of Italy (CNR). In 2017, he received the Italian national scientific qualification as Associate Professor in Structural Engineering.

He teaches the courses entitled "Design and Retrofit of Masonry Structures" and "Diagnosis and Therapy of Structural Failures", giving many invited lectures in different universities and research centres across Europe and USA. He is a Scientific Board Member and teacher of "Structural Failures and Collapses" in the post-graduate MSc Programme in Forensic Engineering. Since 2018, he is expert reviewer of the Italian Ministry for University and Research.

He is Associate Editor of 3 international journals and Editorial Board member of 2 international journals. In almost 20 research projects, his research mainly focused on the following topics: multi-hazard vulnerability of reinforced concrete and masonry structures; innovative structural retrofitting with composite materials; soil-structure interaction; structural robustness; structural health monitoring of existing structures; and risk and resilience of civil infrastructure to natural and man-made hazards.

He authored more than 135 papers in peer-reviewed journals and conference proceedings, 1 book, 10 book chapters, 30 reports, and 3 computer tools for seismic analysis of masonry buildings and experimental data selection of masonry properties. He edited 2 books and 2 journal special issues.



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His research outcomes received the following awards and recognitions: Young researcher award by Macedonian Association for Earthquake Engineering in the framework of the 14th European Conference on Earthquake Engineering (2010); 2 articles among the most cited papers in Engineering Structures (2019, 2020); 1 article among the most cited papers in ASCE Journal of Performance of Constructed Facilities (2018); 1 article among the most cited papers in Engineering Failure Analysis (2017); article "Learning from construction failures due to the 2009 L'Aquila, Italy, earthquake" among the best 2010 papers of Journal of Performance of Constructed Facilities (2011). Some studies authored by Fulvio Parisi were implemented or cited in guidelines published by the American Concrete Institute (ACI) and CNR.

He was a scientific or organizing committee member of more than 15 international conferences, and coordinator or member of working groups in several associations and standard bodies, such as Fédération Internationale du Béton (fib), CNR, Comité Européen de Normalisation (CEN), and Ente Nazionale di Normazione (UNI).

In 2019, he founded the spin-off company FORENSICS srl (FOREnsic ENgineering ServICes), where he is Head of Civil and Risk Engineering services.

In 2020, he was included in the list of World's Top 2% Scientists according to the scientific impact of his research activity.

2. Dottorandi dei quali i proponenti sono stati tutor nell'ultimo triennio

<i>n. 1 + 2</i>	Prof. Giorgio Serino: Simone Galano (XXXIV ciclo, borsa POR industriale) Prof. Fulvio Parisi: Martina Scalvenzi (XXXIV ciclo, borsa ministeriale), Giacomo Miluccio (XXXV ciclo, borsa finanziata da progetto di ricerca)
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3. Titolo della ricerca proposta

Analisi strutturale multi-livello e tecnologie sostenibili per la mitigazione del rischio e la valorizzazione del costruito storico in muratura

4. Area Tematica



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Ingegneria Geotecnica ☐

Ingegneria Strutturale ☒

Rischio Sismico ☐

5. Sintesi del progetto di ricerca

Historical masonry constructions are a significant part of the existing built heritage at worldwide level. Despite their cultural, artistic, and socio-economic value, in most cases, such constructions are not effectively protected against natural hazards. Several numerical and experimental studies have highlighted the high vulnerability of masonry constructions, evidencing the key role of material properties, structural geometry, flexible diaphragms and vaults, wall-to-wall and floor-to-wall connections, and degradation phenomena. Nonetheless, the assessment and reduction of structural vulnerability of historical masonry constructions still need to be investigated.

This project will deal with this topic by integrating digital technologies for survey with multi-level methods of structural response analysis, vulnerability assessment procedures, and low-cost, environmentally friendly systems for structural retrofitting.

Multi-level structural modelling will be based on methods with different levels of sophistication and accuracy, such as macro-block methods, macro-element methods, finite element method, and discrete element method.

Digital technologies will be selected and used in cooperation with a partner company, which is specified below and has long experience on real projects. Digital technologies for survey, diagnosis, automatic modelling, and structural health monitoring of historical constructions will be taken into account. Special care will be paid to seismic safety, considering degradation phenomena and previous failures, also in connection with climate change.

Real case studies for the implementation and validation of methodologies will involve historical constructions located in the ancient centre of Napoli. Some of those constructions are owned by the Municipality of Napoli, but they are not in use. Hence, this project is expected to have an impact on urban regeneration as well as conservation and valorization of cultural heritage.



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6. Pubblicazioni sul tema di ricerca

- Augenti N., Parisi F. (2019). *Teoria e Tecnica delle Strutture in Muratura*. Hoepli, Milano.
- Augenti N., Parisi F., Prota A., Manfredi G. (2011). In-plane lateral response of a full-scale masonry sub-assembly with and without an inorganic matrix-grid strengthening system. *ASCE Journal of Composites for Construction*, 15(4):578-590.
- Calabrese A., Spizzuoco M., Serino G., Corte G.D., Maddaloni G. (2015). Shaking table investigation of a novel, low-cost, base isolation technology using recycled rubber. *Structural Control and Health Monitoring*, 22(1):107-122.
- Hadad H.A., Calabrese A., Strano S., Serino G. (2017). A base isolation system for developing countries using discarded tyres filled with elastomeric recycled materials. *Journal of Earthquake Engineering*, 21(2):246-266.
- Losanno D., Ravichandran N., Parisi F., Calabrese A., Serino G. (2021). Seismic performance of a low-cost base isolation system for unreinforced brick masonry buildings in developing countries. *Soil Dynamics and Earthquake Engineering*, 141: 106501.
- Parisi F., Augenti N. (2013). Seismic capacity of irregular unreinforced masonry walls with openings. *Earthquake Engineering and Structural Dynamics*, 42(1):101-121.
- Parisi F., Augenti N., Prota A. (2014). Implications of the spandrel type on the lateral behavior of unreinforced masonry walls. *Earthquake Engineering and Structural Dynamics*, 43(12):1867-1887.
- Parisi F., Balestrieri C., Asprone D. (2016). Nonlinear micromechanical model for tuff stone masonry: Experimental validation and performance limit states. *Construction and Building Materials*, 105:165-175.
- Parisi F., Lignola G.P., Augenti N., Prota A., Manfredi G. (2013). Rocking response assessment of in-plane laterally-loaded masonry walls with openings. *Engineering Structures*, 56:1234-1248.
- Spizzuoco M., Calabrese A., Serino G. (2014). Innovative low-cost recycled rubber-fiber reinforced isolator: Experimental tests and finite element analyses. *Engineering Structures*, 76:99-111.

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

The research activity is connected to a number of numerical and experimental investigations, which are underway within the following research projects:

- PRIN DETECT-AGING “Degradation Effects on sTructural safEty of Cultural heriTAGE constructions through simulation and health monitorING”;



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- PON INSIST “Smart monitoring system for safety of urban infrastructure”.
However, other projects could be funded on the topic.
Activities might be also carried out in potential ReLUIS-DPC projects, focusing on risk maps and seismic damage scenarios.

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

The research activity will mainly consist of numerical research, which is supported by the above-mentioned research projects. Such projects also provide funding for grants and missions to attend meetings, workshops and conferences.

9. Informazioni relative ad un periodo di ricerca all'estero (minimo tre mesi) previsto per il dottorando

The PhD student is expected to spend **6 months** at **University College London** (UCL, UK) in cooperation with **Prof. Dina D'Ayala** (d.dayala@ucl.ac.uk), who is Professor of Structural Engineering within the Department of Civil, Environmental and Geomatic Engineering. She is Head of Civil Engineering and Co-Director of the Earthquake and People Interaction Centre (EPICentre). She has long experience particularly on the assessment, strengthening, preservation and resilience of existing buildings, structures, transport infrastructure and cultural heritage.

Prof. D'Ayala will supervise the PhD student with special emphasis on structural vulnerability analysis, accounting for different failure modes of masonry constructions. Special attention will be given to the possible occurrence of local failure modes, which can partially or totally neutralise the activation of the in-plane resistance of load-bearing walls.

Other international research institutions that could cooperate with the PhD student are Universidade do Minho (Portugal) under supervision of Prof. Paulo Lourenço and Universidade de Vigo (Spain) under supervision of Prof. Mario Pansera. Prof. Lourenço is Director of the Master course in Structural Analysis of Monuments and Historical Constructions (SAHC), whereas Prof. Pansera is Director of the Post-growth Innovation Lab focusing on economic sustainability and growth.



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10. Eventuali collaborazioni con imprese/aziende sul tema di ricerca

The PhD student will spend **12 months** at **TECNO IN s.p.a.** to learn and use innovative digital technologies for survey, structural health monitoring and diagnosis of historical constructions. TECNO IN s.p.a. has long experience in research, with over 30 projects in last years – some of which at European level – in cooperation with major public/private research entities (<https://www.tecnoin.it/innovazione/#ricerca>).

Napoli, 6 ottobre

FIRME




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 30/04/2020**.