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

XXXVII CICLO

Il sottoscritto prof. Salvatore Sessa

(PO □ PA □ RU □ RTD X) afferente al Dipartimento di Strutture per l'Ingegneria e l'Architettura

S.S.D. 08/B2 – Scienza delle Costruzioni

CHIEDE

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

- **Curriculum of the proponent**

Dr. Salvatore Sessa is RTDB at the University of Naples Federico II since 2019. He graduated in Civil Engineering in 2006 and got his PhD in Engineering of Materials and Structures in 2009. During the PhD course, his research was focused on computational algorithms for the random vibration analysis of structures with asymmetric hysteresis and he has been visiting scholar at the University of California, Berkeley, for 18 months under the supervision of the Taisei professor Armen Der Kiureghian.

During his career he was involved in more than 10 research projects at the University of Naples Federico II, University of Naples, Parthenope and at the Politecnico di Milano, published 20 papers in international journals and presented several contributions at national and international conferences.

His research activities concerned several fields of structural engineering including:

- identification of constitutive parameters of cohesive delamination of bonded joints;
- Finite element seismic analysis of nonlinear framed and shell structures;
- Analysis of elastic half-spaces subject to surface loading;
- Computational algorithms for random vibration analysis by finite elements.

His investigations about delamination concerned the identification of the constitutive parameters of double-cantilever-beam specimens subjected to Mode-I and/or Mode-III

cohesive delamination based on full-field kinematic data obtained by Digital Image Correlation.

In 2014 he got a postdoc position at the University of Naples Federico II where he investigated nonlinear analysis of structures and implementation of shell finite elements accounting for transverse confinement.

From 2016 to 2019 he worked as junior researcher (RTDA) and focused his research on the developments of computational algorithms concerning the nonlinear dynamic analysis of structures. Moreover, he was teacher of Theory of Structures and supervised several bachelor and master thesis in Civil Engineering, Mechanical Engineering and Architecture.

He got the qualification for associate professorship by the Italian government (ASN) in 2018.

He is member ASCE (American Society of Civil Engineers) since 2015, of the IFIP WG7.5 – International Federation for Information Processing – Work Group 7.5 – Reliability and Optimization of Structural Systems, dal 2012 and of the AIMETA (Associazione Italiana di Meccanica Teorica ed Applicata) group "Stochastic Mechanics".

- **PhD candidates supervised by the proponent during the last three years**

n. 1	*1 PhD candidate with no fellowship, XXXVI cicle*

3. Title of the research proposal

Nonlinear analysis and experimental assessment of historical vestiges

4. Thematic area

Geotechnical engineering □

Structural engineering X

Seismic risk □

5. Research proposal synopsis

Protection of archeological vestiges represents a pivotal issue for preserving identity, history and culture of our society.

Within the worldwide historical heritage context, Campania Region hosts some of the most significant archaeological sites of the world, such as Pompeii, Ercolano, Oplonti, Baia and Cuma. Most of them belong to fragile areas and are threatened by different natural hazards. In particular, the presence of the Vesuvio and Campi Flegrei volcanos induces both hazards directly related to eruptions, such as ash falls, pyroclastic flows, ballistics etc, and phenomena related to the quiescence activity, such as seismic motions, bradyseism and landfalls.
The high value of potentially occurring hazards, the peculiarity of exposed elements (historical buildings, frescos, cast people, painted walls and ceilings, fountains, pools) and their high vulnerability under effect of expected events induce a very high volcanic risk.

The project goal is to get substantial improvements in evaluating exposure and vulnerability of the archaeological heritage.
During a first phase of the program, the elements exposed to risk will be investigated, by ad hoc survey activities, for a preliminary identification of the typological classes, defined as function of vulnerability factors, including geometrical and mechanical characteristics of original structures (walls, arches, etc.), past structural retrofitting (protective roofs, interventions on the walls, walkways for the touristic use and/or removal of architectural barriers) and peculiar features of artistic assets, such as mosaics and frescoes.

The second phase of the program concerns the development of the formulation and calibration of computational models of three case-studies selected within the surveyed vestiges. Calibration will be performed by means of experimental tests on scaled models

and inverse identification techniques.
Finally, the computational framework will be employed in structural reliability analyses based on Tail-equivalent linearization in order to determine the vulnerability of the selected case-studies.

6. Selected publications

- Sessa, S. Multiobjective non-linear random vibration analysis for performance-based earthquake engineering (2010) Reliability and Optimization of Structural Systems - Proceedings of Reliability and Optimization of Structural Systems, pp. 185-192.
- Pellecchia, D., Sessa, S., Vaiana, N., Rosati, L. Comparative assessment on the rocking response of seismically base-isolated rigid blocks (2020) Procedia Structural Integrity, 29, pp. 95-102.
- Marmo, F., Marmo, M., Sessa, S., Pagliano, A., Rosati, L. Thrust membrane analysis of the domes of the baia thermal baths (2020) Lecture Notes in Mechanical Engineering, pp. 1918-1927.
- Zuccaro, G., Dato, F., Cacace, F., de Gregorio, D.D., Sessa, S. Seismic collapse mechanisms analyses and masonry structures typologies: A possible correlation (2017) Ingegneria Sismica, 34 (4), pp. 121-149.
- Sessa, S., Serpieri, R., Rosati, L. Probabilistic assessment of historical masonry walls retrofitted with through-The-Thickness confinement devices (2017) AIMETA 2017 - Proceedings of the 23rd Conference of the Italian Association of Theoretical and Applied Mechanics, 3, pp. 2324-2332.
- Marmo, F., Masi, D., Sessa, S., Toraldo, F., Rosati, L. Thrust network analysis of masonry vaults subject to vertical and horizontal loads (2017) COMPDYN 2017 - Proceedings of the 6th International Conference on Computational Methods in Structural Dynamics and Earthquake Engineering, 1, pp. 2227-2238.

7. Funded research projects about the research proposal

MuRa - Multi-risk assessment and structural protection of archaeological vestiges in volcanic scenarios

8. Funds for scolarships, equipment and travel expenses
None

9. Information about possible visiting appointments abroad of the PhD candidate
Research activities may include a visiting appointment of 6 months at the Zhejiang University under the supervision of Dr. Cristoforo Demartino cristoforodemartino@intl.zju.edu.cn . The appointment will be focused on an experimental campaign on scaled models of historical vestiges.

10. Possible cooperation activities with private firms and industries
None

Napoli, 08-04-2021 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 **venerdì 30/04/2020**.