PhD Program in Civil, Chemical and Environmental Engineering
Curriculum in Structural and Geotechnical Engineering, Mechanics and Materials

June 2024 Call, XL cycle - Starting date: November 1 st 2024

The research projects submitted for the admission to the PhD program must be prepared in accordance to one of the projects listed in this file, which are organized by general thematics. Click on the Thematic you are interested in to see the full list of projects.

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Projects in Structural Engineering and Mechanics

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Thematic: Structural Engineering and Mechanics

Project: Developments of Vortex-Induced Vibration models for engineering applications

Keywords: Aerodynamics, Aeroelasticity, Experimental tests, Reduced-order models, Vortex-Induced Vibrations

Brief Description:

Vortex-Induced Vibrations (VIVs) represent one of the most important issues concerning wind excited slender structures in both air and water. Despite its great significance, the engineering description of this phenomenon mainly relies on experimental evidence and empirical models.

Engineering verifications (e.g., EN 1991-1-4, 2005, 2010) commonly use two calculation procedures. The spectral model (Vickery & Basu 1983, J Wind Eng Ind Aerodyn 12(1), 49-74) supplies an analytical expression for an equivalent aerodynamic damping; the harmonic model (Ruscheweyh 1994, In: Sockel, Wind-Excited Vibrations of Structures. Springer-Verlag, Wien) supplies a vortex-induced force. The spectral formulation is considered sounder, more prudential and more reliable at high Scruton numbers, where the response tends to be in the so-called “forced vibration” regime. Both formulations may involve considerable uncertainties compared to full-scale measurements. Recent developments suggest that a classic van der Pol formulation, as used in the spectral model, may no longer be reliable (e.g., Lupi et al. 2021, J Wind Eng Ind Aerodyn 208 104438, Guo et al. 2022, J Wind Eng Ind Aerodyn 221 104887).

However, engineering applications often need extreme simplifications, the reliability of which has not yet been adequately explored. There are also classes of slender structures, such as chimneys, tubular poles and super tall buildings, in which resonant vortex shedding can be resonant with higher vibration modes, leading to intense vibrations and fatigue damage. In this case, the spectral method does not yet find a codified procedure, effectively making this procedure unusable. Moreover, several issues are still open, such as the choice of the limiting vibration amplitude in the lock-in regime and the estimation of the peak coefficient in transient regime.

With particular reference to the spectral method, the proposed project will investigate developments for technical applications, focusing on the parameters whose choice is crucial in the response calculation of lightweight, low-damped systems, as well as on the generalization to higher vibration modes. The project may include experimental tests carried out in the "Giovanni Solari" Wind Tunnel (GS-WT) and/or in the Tokyo Polytechnic University (TPU) Wind Tunnel as well as on full scale structures.

Referents: Luisa Pagnini (luisa.pagnini@unige.it), Giuseppe Piccardo (giuseppe.piccardo@unige.it)

Link to the list of projects

Thematic: Structural Engineering and Mechanics

Project: Aerodynamic and aeroelastic behavior of square-shaped cylinders in stationary and non-stationary flow conditions

Keywords: Aerodynamics, Aeroelasticity, Non-stationary flow conditions, Wind Engineering, Wind tunnel testing

Brief Description:

Square-shaped cylinders are subject to aerodynamic instabilities such as galloping and vortex shedding. A classical technique to optimize their response to wind action is to modify the edges into rounded corners. This approach has been the focus of numerous numerical, experimental, and combined studies over the past decade, particularly in relation to the behavior of tall buildings. The dependency on the Reynolds number further complicates this issue. To the best of our knowledge, the effect of possible unsteady flow conditions, such as flow accelerations or variations in the angle of attack of the incident flow, has not yet been extensively investigated. Recent results from static tests in accelerating flow (Brusco et al. 2022, J Wind Eng Ind Aerodyn 230 105182) indicate that constant shedding frequency intervals occur during transients, separated by discontinuities (Figure 1).

The proposed project aims to enhance knowledge on this vast and still relatively unexplored topic. After a thorough review of available literature, static and dynamic experimental tests will be conducted in the Giovanni Solari Wind Tunnel (GS-WT) on sectional models equipped with pressure taps. The GS-WT, which has extensive experience in testing sectional models under steady flows, is currently being equipped with an active grid to simulate unsteady flow conditions representative of non-synoptic wind events. The experimental analysis will be complemented by analytical modeling (with reduced-degree-of-freedom models) and computational numerical analysis. Comparisons with the three-dimensional behavior of rounded-edge square cylinders will also be examined. This research is expected to be conducted in collaboration with Dr. Stefano Brusco of Western University, Canada.

Referent: Giuseppe Piccardo (giuseppe.piccardo@unige.it)

Figure:

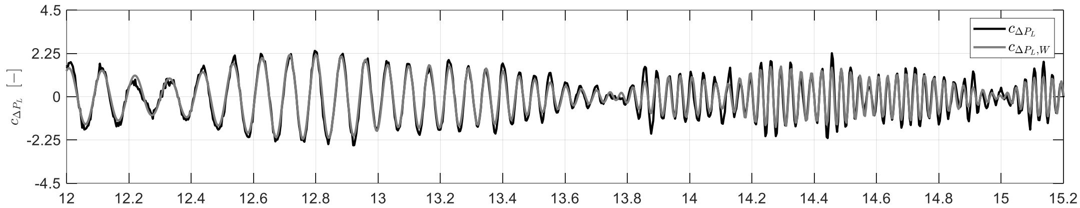

Figure 1 – Non-dimensional crossflow coefficient $c_{\Delta P_L}$, with its wavelet filtering, during a ramp-up test

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***Thematic*: Structural Engineering and Mechanics**

Project: Fragility analysis of roof structures in low-rise buildings subjected to non-synoptic outflows

Keywords: Non-synoptic winds, Wind fragility, Resilience strategies, Wind tunnel testing, Wind loading, Roof damage, Performance-based design

Brief Description:
Recent catastrophic events in Italy and Europe have highlighted the vulnerability of roof structures to extreme wind induced uplift, often resulting in large economic losses and disruption for those assets. The most destructive events are frequently associated to non-synoptic winds, such as tornadoes and downbursts (Figure 1). Effective prioritization of highly vulnerable structures is key to risk mitigation and enhancing resilience strategies. The present proposal is addressed to investigate the vulnerability of roof structures to extreme wind actions by means of fragility curves. Fragility curves are extensively adopted in seismic field (e.g. [1]) to assist in the development of a performance-based or risk consistent design procedure in a fully probabilistic approach. The same procedure can be reformulated to consider wind loadings and its inherent random nature in speed and direction (e.g. [2]). Specifically, the transient aerodynamic effects caused by downburst accelerated flows can be analyzed through experimental tests in the Giovanni Solari Wind Tunnel. This will involve using an innovative active grid capable of replicating the main characteristics of non-synoptic outflows in a classical atmospheric boundary layer wind tunnel facility. The results of the proposed project, combined with hazard characterization, will facilitate the study of risk analysis of existing buildings and historical heritage sites against downburst extreme events. Moreover, it will be helpful for determining retrofit options to strengthen existing buildings against this type of extreme meteorological phenomena.

[1] Tomassetti, U, Correia, A.A., Graziotti, F., Penna, A. (2019). Seismic vulnerability of roof systems combining URM gable walls and timber diaphragms. Earthquake Engineering & Structural Dynamics, 48, 1297-1318. DOI: 10.1002/eqe.3187

[2] Gavanski, E., Kopp, G.A. (2017). Fragility Assessment of Roof-to-Wall Connection Failures for Wood-Frame Houses in High Winds. ASCE-ASME J. Risk Uncertainty Eng. Syst., Part A: Civ. Eng., 2017, 3(4): 04017013

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Figure: Donwburst over Pianura Padana (Italy) (a) and consequent roof collapse (b)

a) 
b) 

Link to the list of projects

***Thematic*: Structural Engineering and Mechanics**

Project: Serviceability assessment of lightweight structures to human-induced vibration

Keywords: Human-induced vibrations, Numerical simulations, Probabilistic Model, Vibration serviceability

Brief Description:
Human-induced vibration serviceability assessment of lightweight structures requires a probabilistic model of human-induced loading taking into account the variability of human walking parameters, including step frequency, arrival time, walking speed. When pedestrian density is high, human walking parameters are also affected by the interaction among pedestrians. Such an interaction can be modelled by suitable macroscopic or microscopic crowd models (e.g. the social force model). Numerical simulations can be very time consuming and not practicable at the design stage. Frequency-domain spectral models represent a valid alternative for a reliable assessment of the dynamic response.

The present research project aims to provide a reliable probabilistic model of human-induced loading on structures. A wide review of the different models proposed in the literature to schematize pedestrian interaction is expected in order to select the most suitable models to be implemented. A probabilistic characterization of human-induced loading will be derived based on numerical simulations of pedestrian traffic on domains of variable geometries representative of floors and footbridges. The final goal of the research is the introduction of a general formulation for the equivalent spectral model of the loading that can be adopted for vibration serviceability assessment of lightweight structures with variable geometrical configurations and in different traffic conditions (mono/bi-directional, unrestricted/restricted).

The project can be focused on numerical and/or experimental validation, eventually carried out in collaboration with international partners (e.g. KU Leuven, TU/Eindhoven, ULiege).

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Figure:

Link to the list of projects

***Thematic*: Structural Engineering and Mechanics**

Project: Nonstationary dynamic response of structures to thunderstorm outflows

Keywords: Dynamic response, Evolutionary spectra, Nonstationary, Thunderstorms

Brief Description:
In design codes, the calculation of wind effects on structures is based on a stationary model for the wind field, reliable for cyclonic phenomena at the synoptic scale. However, most of the wind damage to structures results from thunderstorms that generate highly transient wind fields. Within the THUNDERR Project, funded by the European Research Council (ERC) with an Advanced Grant 2016, a non-stationary evolutionary model of wind speed of thunderstorms measured at a single point was introduced and applied for the evaluation of the maximum dynamic response to thunderstorms of single-degree-of-freedom systems.

The goal of the present project is the extension of the non-stationary evolutionary loading model to spatially extended domains and the introduction of calculation methods for estimating the maximum dynamic response of structures. The first task is the introduction of a suitable model for the statistical characterization of the thunderstorm-induced wind field along a linear domain. Based on such a model, the most appropriate method for the statistical characterization of the structural dynamic response should be selected, and the possibility of adopting the simplified equivalent wind spectrum technique evaluated.

The project can include an experimental validation of the proposed models though wind tunnel tests on a benchmark tall building, to be carried out in the Giovanni Solari Wind Tunnel at UniGe or in collaboration with international partners.

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Relevant links: http://www.thunderr.eu/

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***Thematic*: Structural Engineering and Mechanics**

Project: Rotation capacity of stone block masonry for arch bridges

Keywords: arch bridges, stone block masonry, rotation capacity, kinematic method, load carrying capacity, assessment, safety

Brief Description:

The assessment of masonry arch bridges is one of the challenges of Structural Engineering. In spite of several procedures available, such as FEM methods, detailed and simplified approaches, the most widely used procedure relies on a Kinematic Approach (Heymann [1]) assuming that the load carrying structure of a masonry bridge is the arch and that the infill and the spandrels are secondary elements. Relying on this approach, a large number of arch bridges has been analyzed and often found inadequate to their tasks, resulting in heavy retrofitting works at the cost of the destruction of the bridge historical value.
The Kinematic Approach assumes that masonry displays an unbounded rotation capacity provided that the axial load is below 25% of its l.c.c.. This threshold comes from the works of Thurliman in the 80's [2-4] and is assumed in the Swiss code SIA V177/2 (see related links). A completely open issues is: what if the axial thrust were larger than 25% of the material l.c.c.? Nowadays, in these cases the bridge undergoes severe retrofitting works……. but are these works really needed?
Thurlimann estimated the rotation capacity with pre-defined axial thrust from tests on rather slender walls (2.5m high and 0.9m thick) of solid clay brick masonry, which is not exactly the standard masonry for a Swiss arch bridge, which consists of regular stone masonry, with relatively good mortar. In this case, the three-axial compressive stress field in the mortar joints suggests a high rotation capacity of such a masonry also if the axial thrust exceeds the threshold of 25% of its ultimate l.c.c.
An experimental program is going to be developed: i) building of specimens of stone block marsonry (variable joint thickness and mortar type); ii) testing the ultimate axial force; iii) testing the rotation capacity of specimens load at 25%, 50% and 75% of their ultimate axial l.c.c. Tests will be performed according to a displacement-controlled loading system already available in the Dept. Laboratory (already used for similar tests) and the specific devices needed to apply the rotation are being developed these days (end of May 2024) and will be tested in June 2024 on sacrificial specimens.

This research program has been defined in cooperation with Eng. A. Pederzani, member of the *Pini & partners design buro*, located in Gromo (Switzerland – www.pini.group)

[1]. Heyman, J. (1966). The stone skeleton. *International Journal of solids and structures*, *2*(2), 249-279.
[2] Furler, R., & Thürlimann, B. (1980). *Versuche über die Rotationsfähingkeit von Kalksandsteinmauer-werk* (Vol. 7502, No. 2). Birkhäuser.
[3] Thurlimann, B., & Schwartz, J. (1986). Masonry walls under centric and eccentric normal force. In *IABSE proceedings* (No. 1, pp. 17-24).
[4] Thurlimann, B., & Schwartz, J. (1987). Design of masonry walls and reinforced concrete columns with column-deflection-curves. In *IABSE proceedings* (No. 1, pp. 17-24)

Referent: Antonio Brencich (brencich@dicca.unige.it)

Relevant links: www.pini.group
www.masonry.org.uk/downloads/eccentric-shear-and-normal-forces-in-structural-masonry/

Link to the list of projects

***Thematic*: Structural Engineering and Mechanics**

Project: Modelling the structural behaviour of historic reinforced concrete frames with thick masonry infills

Keywords: existing structures; masonry infills; seismic response;

Brief Description:
Reinforced concrete (RC) frames constructed in the early 20th century often feature thick masonry infills, which were used due to their durability and acoustic and thermal properties. However, the interaction between these RC frames and such thick masonry infills poses significant challenges in structural modeling, particularly under seismic loading conditions. This research aims to develop a comprehensive structural model that accurately represents the complex interaction between early 20th century RC frames and thick masonry infills.

The study will focus on the following objectives: (1) investigating the mechanical behavior of thick masonry infills and their impact on the overall structural performance of RC frames, (2) developing analytical models that incorporate the nonlinear behavior of both the RC frame and the infill, and (3) validating these models through experimental testing and finite element analysis (FEA).

Methodologically, the research will encompass a thorough literature review, material characterization tests, analytical modeling, FEA simulations and, if possible, experimental validation. Expected outcomes include a validated analytical model capable of predicting the behavior of RC frames with thick masonry infills under various loading scenarios and improved guidelines for assessing and retrofitting historical RC structures.

This research will significantly contribute to structural engineering by enhancing the understanding of RC frame and masonry infill interactions, thus aiding in the preservation and safety improvement of historically significant buildings. The findings are anticipated to influence building codes and standards, ensuring the resilience of these structures against contemporary seismic demands.

Referents: Chiara Calderini, (chiara.calderini@unige.it), Stefano Podestà (stefano.podesta@unige.it)

Figure: the building site of San Martino hospital in Genoa, where reinforced concrete frames are infilled with thick masonry stone walls.

Link to the list of projects

***Thematic*: Structural Engineering and Mechanics**

Project: Structural Stability, Risks, Consolidation, and Utilization of Archaeological Sites

Keywords: existing structures; masonry infills; seismic response;

Brief Description:
Archaeological sites are invaluable cultural heritage assets that provide insights into past civilizations and human history. However, these sites are often vulnerable to various risks that threaten their structural stability. Factors such as natural decay, environmental conditions, and human activities can cause significant deterioration. This research project aims to investigate the structural stability of archaeological sites, identify the associated risks, develop consolidation methods, and enhance their utilization for educational and tourism purposes.

Objectives:

- Assess the Structural Stability: To evaluate the current structural stability of selected archaeological sites using advanced techniques such as laser scanning, ground-penetrating radar, and photogrammetry.
- Identify Risks: To identify the primary risks affecting these sites, including environmental factors (weathering, erosion, seismic activity), biological factors (vegetation growth, animal activities), and human factors (vandalism, tourism impact).
- Develop Consolidation Methods: To explore and develop effective consolidation and conservation techniques that can enhance the structural integrity of archaeological sites without compromising their historical value.
- Promote Utilization: To propose sustainable strategies for the utilization of these sites, balancing conservation needs with public access and educational opportunities.

Expected Outcomes:.

- A set of recommendations for effective consolidation techniques tailored to each site.
- Sustainable utilization plans that can be implemented by site managers and local authorities.
- Increased awareness and engagement from the public regarding the preservation of archaeological heritage.

By focusing on the structural stability, risks, consolidation, and utilization of archaeological sites, this research project aims to contribute to the long-term preservation and appreciation of our shared cultural heritage. The findings and recommendations will provide valuable insights for archaeologists, conservationists, and policymakers, ensuring that these irreplaceable sites can be enjoyed by future generations.

Referents: Stefano Podestà, Chiara Calderini (chiara.calderini@unige.it, stefano.podesta@unige.it)

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Projects in Mechanics of Materials

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***Thematic*:** Mechanics of Materials

Project: Peridynamic modeling of biological materials

Keywords: Non-local continua; Constitutive models; Cutting; Soft-tissues; Multi-scale; Microstructure

Brief Description:
Peridynamics is a non-local theory that is designed to unify the mechanics of discrete and continuous media and has shown promise in modeling complex material behaviors at different scales. Rather than using partial differential equations to formulate the equations of motion, peridynamics uses integral equations which exist on crack surfaces. This aspect lends itself to the description of modern problems in mechanics involving damage and spontaneous formation of cracks/discontinuities. Furthermore, the material horizon introduce a strong non-local character which may result of fundamental importance for reproducing microstructural effets and for modelling modern multi-scale problems. Peridynamic theory postulates that material points interact through pair-potentials (bond-based formulations) or multi-body potentials (state-based type formulations). Notably, a special class of peridynamic models, known as correspondence models, provide a bridge between classical continuum mechanics and peridynamics. These models are particularly useful because they allow well-established local constitutive theories to be used within the nonlocal peridynamic mathematical framework. Peridynamics has been used to model diverse phenomena in biomechanics ranging from fracture to aspects of growth and remodeling. Moreover, because the peridynamic framework deals comfortably with both continuous and discrete media, it is a compelling method for modeling biological tissue on the cell population scale where the material is, in reality, somewhere in-between.

The aim of this project is to develop advanced finite deformation peridynamic material models for biological materials providing a rigorous mathematical foundation along with a robust, open, and extendable computational framework of wide applicability for challenging problems in mechanics of materials, computational mechanics and biomechanics.

Referent: Vito Diana (vito.diana@unige.it)

Relevant links: Link1; Link2

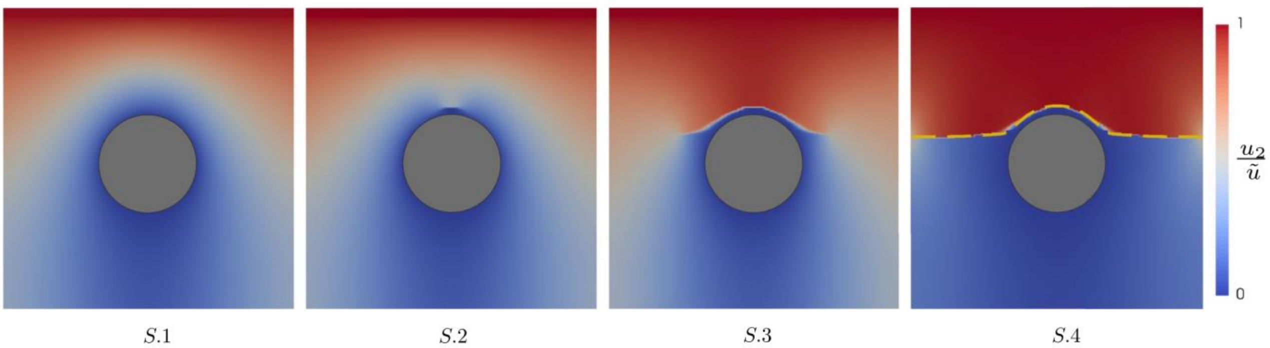

Figure: Discontinuity evolution in a heterogeneous material modeled using peridynamics (Diana V., *Archives of Computational Methods in Engineering* (2023) 30:1305–1344).

Link to the list of projects

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Thematics: **Mechanics of Materials**

Project: Advanced design of avant-garde active microstructured metamaterials

Keywords: Active metamaterials, hierarchical architected microstructure, multi-field physical phenomena, non-local dynamic homogenization

Brief Description:
The design of technologically innovative materials with enhanced or exotic mechanical properties constitutes an area of significant interest in Mechanics. Important results have been obtained with the development of artificial composite materials, a combination of different ingredient materials spatially organized according to avant-garde innovative and optimized topologies. Artificial architected heterogeneous materials and active metamaterials with extreme mechanical performances can be obtained with active periodic microstructures with empty spaces and cavities properly designed. Developments in this open research field still appear to be very promising, as evidenced by the current extensive literature on the subject and the new challenges that result from it. Moreover, the conceptualization and the tailored optimal design of innovative materials with complex microstructures, for cutting-edge and smart applications in many engineering and technological fields, are also fueled by recent developments in the technological fields of high-precision microengineering and high-fidelity additive manufacturing.

Within this framework, the present PhD research project focuses on developing technologies that pave the way to almost endless opportunities for designing avant-garde active materials and metamaterials that can be activated in a controlled fashion to change shape, configuration, or physical properties in response to external stimuli. Advancement of knowledge concerns the conceptualization, modelling, and design, together with prototyping and proof-of-concept of reprogrammable multi-functional metadevices for wave propagation control, energy harvesting, sensing, and stress-controlled failure programs. Physical-mathematical analytical formulations will be exploited to establish the governing equations, which will be solved by means of analytical and computational methods. Enhanced multi-field homogenization/continualization schemes will be conceptualized for a thermodynamically consistent constitutive characterization of active hierarchical metamaterials with complex architected microstructure. Theoretical results will be optimized via homogenization-based optimization numerical schemes and verified by virtual testing.

Referent: Andrea Bacigalupo (andrea.bacigalupo@unige.it), Luigi Gambarotta (luigi.gambarotta@unige.it)

Link to the list of projects

***Thematic*: Mechanics of Materials**

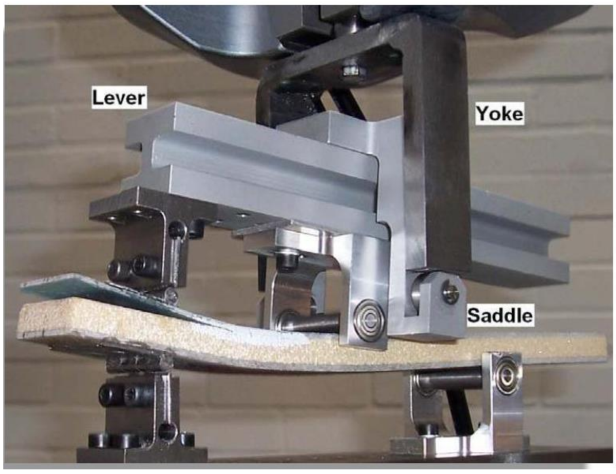
Project: Disbond of sandwich systems in aviation, fundamental solutions and stardardization

Keywords: sandwich composites; characterization of material properties; standardization.

Brief Description:
The aim of the project is to derive fundamental solutions based on elasticity, linear elastic fracture mechanics and nonlinear fracture mechanics to complement and support fracture mechanics experimental tests which are currently under development for the characterization of the resistance to disbond fracture of sandwich composites (static and fatigue) used in aviation and other fields (CMH17, Composite Mechanics Handbook 17). Example of problems we will tackle are: the effects of the boundaries in the sizing of fracture mechanics specimens; the derivation of homogenized properties for honeycomb materials used as sandwich cores; local failure mechanisms due to elastic buckling of core cells during testing. The work will be analytical and numerical.

Referent: Roberta Massabò (Roberta.massabo@unige.it)

Figure: Mixed Mode Bending Sandiwich specimen (courtesy by DTU)



Link to the list of projects

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Projects in Geotechnical Engineering

Project: PILATUS: PIles under LATeral Loading in Unsaturated Soils

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***Thematic*: Geotechnical Engineering**

Project: PILATUS: PIles under LATeral Loading in Unsaturated Soils

Keywords: piles, lateral loading, unsaturated soil, water table, water retention curve

Brief Description:

The growing demand of renewable sources for electricity generation is boosting much research to find solutions to increase the efficiency and resilience of these Critical Infrastructures. Among these, Solar Panels are typically founded on piles. Due to the reduced embedded length, the piles interact with a soil that is often above the ground water table (GWT) and hence partially saturated. In this state, the soil is exposed to changes in both pore pressure and saturation, resulting from the oscillation of the GWT and/or rainfall and drought events. Therefore, a clear understanding of the interaction between the pile, the surrounding unsaturated soil, and the environmental conditions is of the utmost importance to optimise the design and enhance the resilience of these Critical Infrastructures. The available evidence is scarce but suggests that unsaturated conditions play a major role on the pile's response. The influence of partial saturation is usually neglected because the general belief among researchers and practitioners is that this would lead to a conservative and simpler design of the foundation. However, a serious attempt to quantify the influence of partial saturation has not been done yet. In some cases, such as temporary works or piled retained walls, accounting for the conditions of partial saturation of the soil could lead to a significant material saving with beneficial consequences on the reduction of the carbon footprint. On the other hand, soil behaviour, and consequently the soil-pile interaction of permanent structures, is strongly affected by the seasonal variations of the environmental boundary conditions (e.g. water table fluctuations, infiltration and evaporation fluxes). Those effects cannot be successfully analysed without the principles of unsaturated soil mechanics.

The project includes an experimental and a theoretical/numerical part. The latter will be developed at the University of Genova under the supervision of Dr. Lalicata and Prof. Dr. Gallipoli. The experimental part will be carried out by conducting centrifuge tests at the Eiffel University of Nantes (FR). Both experimental and numerical approach will provide an insight into the effect that the matric suction, and its variations, have on the response of piles under lateral loading.

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Other Projects

Project: Wind on vertiports

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***Thematic*: Other projects**

Project: Wind on vertiports

Keywords: CFD, vertiports, wind flow, wind loading, wind tunnel

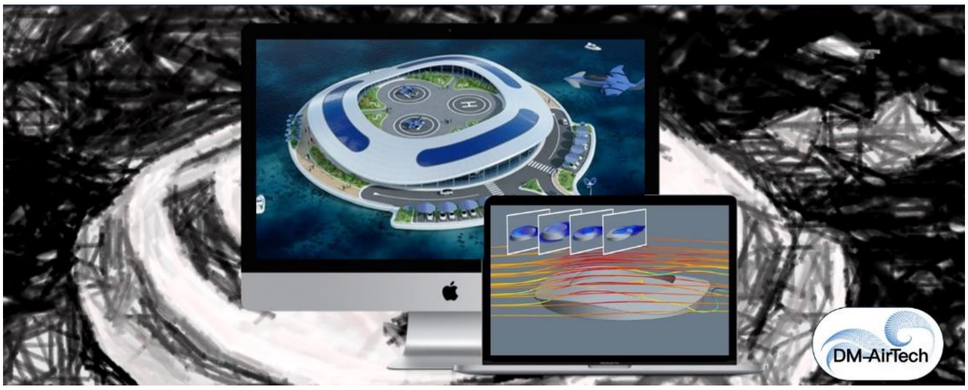
Brief Description:
The Urban and Advanced Air Mobility industry is currently striving to assess where and how to design the infrastructure that is meant to host Drones and Air Taxis (VTOLs) in our cities. Planning and realization of this infrastructure represents a new challenge with respect to what urban planning and the civil aviation are aware of. Flying drones and air taxis into an integrated environment requires the ability to assess upfront their level of operability in terms of ability to land and take off in specific urban areas.
Several papers are available on vertiports' placements but assessing the commuting demand regardless meteorological restrictions to operability (e.g. [1]). Winds on Vertiports proposal aims at developing a procedure for the design and the execution of vertiports, being the latter the principal infrastructure component of this emerging form of mobility. Wind flow characterization is fundamental during the planning phase as well as during the validation of candidate locations and ultimately during their design. The present proposal takes the cue from the ERIES - WonV1 project awarded to DM-AirTech GmbH and currently developed at the Giovanni Solari Wind Tunnel of University of Genova, providing an experimental campaign to investigate wind driven considerations on vertiports concepts to be realized on land and on top of buildings in complex urban areas. The main focus of the ERIES project is the generation of benchmarking data to validate the advanced computing methodologies required to model correctly wind properties and turbulence content on the Final Approach and Take Off area (FATO). The PhD research project will be addressed to further enhance the state of the art in computational models based on high degree of automation and robustness to downscale the wind flow prediction necessary for vertiports preliminary design, shape and structural optimization and FATO operability. The project will be developed in collaboration with DM-AirTech.

[1] Reiche, C., Cohen, A. and Fernando, C. (2021). An Initial Assessment of the Potential Weather Barriers of Urban Air Mobility. EEE Transactions on Intelligent Transportation Systems, 22-9, 6018-6027.

Referents: Repetto Maria Pia (repetto@dicca.unige.it), Burlando Massimiliano (massimiliano.burlando@unige.it)

Relevant links: www.eries.eu www.dm-airtech.com www.gs-windyn.it

Figure: Concept design of Vertiport (Credits to Gian Carlo Zema Design Group and DM-AirTech)



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