3rd International Symposium on Dynamics and Aerodynamics of Cables

ISDAC 2023

JUNE 15-17, 2023

Faculty of Civil and Industrial Engineering
Sapienza University of Rome

Programme Book

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di Genova

ISDAC2023 - 3rd International Symposium on Dynamics and Aerodynamics of Cables
Faculty of Civil and Industrial Engineering, Sapienza University of Rome, Italy
June 15-17, 2023

CONTENTS

1 PREFACE

At its first edition held in Liège (Belgium) in 1995, the Conference was called the International Symposium on Cable Dynamics (ISCD). The Conference was held every two years until 2011 and past editions have been the following: Tokyo, Japan 1997, Trondheim, Norway 1999, Montreal, Canada 2001, Santa Margherita Ligure, Italy 2003, Charleston, USA 2005, Vienna, Austria 2007, Paris, France 2009, Shanghai, China 2011. In 2014, the Conference was changed to Cable Dynamics and Aerodynamics Symposium (SDAC) and was held in Kongens Lyngby, Denmark. From 2017 to now the Conference was established as The International Symposium on Dynamics and Aerodynamics of Cables, ISDAC, and currently consists of several research institutes. In continuity with the background of the past editions, this Symposium aims to promote the development of traditional and emerging areas on Dynamics and Aerodynamics of Cables. The conference was held in Porto, Portugal 2017 and in Stavanger, Norway 2021. The International Symposium on Dynamics and Aerodynamics of Cables (ISDAC 2023) will be held on June 15-17, 2023 in Rome, Italy, organized under the auspices of Ordine degli Ingegneri di Roma. The ISDAC 2023 Symposium will be hosted by the DISG - Department of Structural and Geotechnical Engineering of Sapienza University of Rome (Italy) and organized with the contribution of DICA - Department of Civil and Environmental Engineering of Politecnico di Milano (Italy), DICCA - Department of Civil, Chemical and Environmental Engineering of University of Genoa (Italy). The main topics of the conference include nonlinear cable dynamics, cable structures and moving cables, cable aging, fatigue, degradation and failure mechanisms, laboratory testing of cable dynamics and aerodynamics, field investigations of cable dynamics and aerodynamics, computational models for cable dynamics and fluid-structure interaction, cable vibration control, cable-driven parallel manipulators and cable cranes, monitoring of cable performance, environmental and anthropic loads on cable structures, new materials for structural cables, design performance criteria. On behalf of ISDAC2023, we would like to express our great appreciation to all sponsors, members of scientific committees, organizing committees, and participants of this workshop. We also express our special thanks to all the people who are involved in the organization of the conference. We hope you enjoy the ISDAC2023 Sysmposium and stay in Rome.

Sincerely

Vincenzo Gattulli - Sapienza University of Rome

Luca Martinelli – Politecnico di Milano

Marco Lepidi - University of Genoa

2 WELCOME MESSAGE

It is a great honor and pleasure to warmly welcome you to the 3rd International Symposium on Dynamics and Aerodynamics of Cables ISDAC. The Conference aims to assess current progress in cable dynamics and aerodynamics, developing synergies among researchers in various disciplines from different countries to facilitate joint research projects. After the previous editions this year, the Sapienza University of Rome has organized the conference in Italy and is hosted it at the DISG Department of Civil and Geotechnical Engineering. The 3rd edition (ISDAC 2023) aims to bring in Rome prestigious speakers from all over the World for days of exciting keynote lectures, technical presentations, and panel discussions on various aspects of the current Dynamics and Aerodynamics of Cables, addressing the most important advances of our discipline in major countries around the World. The conference will allow a constructive exchange of ideas, knowledge and opportunities, to create a fruitful, collaborative, multidisciplinary environment and identify new challenging lines of theoretical and applied research, as well as future directions of technological progress. The conference aims to disseminate the results of scientific research programmes, recent methodological developments and advanced engineering applications. With this message, we want to take the opportunity to thank all the participants, and the organizers of the technical and special sessions, and to acknowledge the support of the many exhibitors and sponsors that will showcase their latest developments in many areas pertinent to the cable field.

We hope the participants will enjoy a great workshop and an enjoyable visit to soak up the two and a half millennia of Rome city, with a dolce vita lightness of heart to be shared together during our Gala Dinner at 20.00 on June 15th.

Sincerely

Vincenzo Gattulli - Sapienza University of Rome

Luca Martinelli – Politecnico di Milano

Marco Lepidi - University of Genoa

3 COMMITTEES

SCIENTIFIC COMMITTEE

Alberto Zasso, Politecnico di Milano, IT
Allan Larsen, Technical University of Denmark, DK
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Andrea Arena, Sapienza University of Rome, IT
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Francesco Potenza, University G. d'Annunzio of Chieti-Pescara, IT
Cecilia Rinaldi, Sapienza University of Rome, IT
Daniele Sivori, University of Genoa, IT

4 CONFERENCE CHAIRS

Vincenzo Gattulli

DISG Department of Structural and Geotechnical Engineering
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Vincenzo Gattulli is Full Professor of Solid and Structural Mechanics, Sapienza - University of Rome at the DISG department, and he is engaged in research activities conducted with analytical, numerical and experimental methods in the topics of structural and computational mechanics concerning dynamics problems, identification and control. These activities were also carried out in cooperation with several national and international scientific institutions.

He has been involved in the development of national (CNR, MIUR, MAE, CIPE) and international (FP6-EU, FP7-EU, Horizon 2020, NSF-USA) research projects, participating/ coordinating about 30 research projects (including 7 Projects of National Interest - PRIN). He was secretary general of the three-year project SICON (Stability, Identification and Control in Nonlinear Structural Dynamics) funded by the European Commission as part of a Marie Curie action of the sixth framework program; PI e CO-PI of strategic project for University of L'Aquila RICOSTRUIRE, INCIPICT and SICURA financed by MISE Minister of Economic Development; PI European Union Grant Agreement n. 800687 for the research project titled "DESDEMONA - DEtection of Steel DEfects by Enhanced MONitoring and Automated procedure for self-inspection and maintenance" supported by the call RFCS 2017 (2017-2022); PI NATO research project titled "IRIS - Inspection, maintenance and security pursued by innovative Robots, enhanced data communication and Infrastructure digital twinS" in the framework of the Science for Peace and Security (SPS) Programme with Grant number SPS G5924 (2022-2024); PI research project titled "ERIS - Nano-loaded strain gauges placed by robots for monitoring monumental structures" financed PO FESR LAZIO 2014/2020 (2022-2023). Inventor of a "System for inspecting and/or treating large surfaces", an international licensed patent.

He's a member of the editorial boards of 10 international journals and a reviewer for numerous scientific journals. He carries out wide-ranging teaching activities as a teacher of institutional courses, specialization, and international courses. He is the author of 235 scientific publications with 61 articles in international journals.

Luca Martinelli

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Luca Martinelli is, since 2015, Associate Professor of Strength of Materials/Structural Mechanics at the Department of Civil and Environmental Engineering of Politecnico di Milano. He previously has been, since 2001, Assistant Professor of Structural Design at the Department of Structural Engineering of the same institution.

He holds a M.Sc in Civil Engineering and a Ph.D in Seismic Engineering, both obtained from Politecnico di Milano.

His main research activities are concerned with the dynamic behaviour and structural control of large flexible structures sensible to interaction with the surrounding environment, the seismic assessment and behaviour of structures and bridges, the modelling of the hysteretic behaviour of structural members both at a macro and micro scale level.

He is author or co-author of more than one hundred indexed papers published in peer-reviewed national and international journals, or presented at national and international conferences. He is a reviewer for a number of international Journals and Academic Editor for Mathematica Problems in Engineering.

He has been Co-Principal Investigator and Principal Investigator in several Research Contracts for Public and Private companies related to the mitigation of the seismic vulnerability of industrial plants and pipelines, dynamic loads due to wind on petrochemical plants, dynamic action due to working conditions and wind on machine foundations, mitigation of the seismic response of Liquid Gas Containers, vibrations of building due to traffic excitation, vibrations of buildings due to ship impacts.

At Politecnico di Milano he currently teaches “Structural Mechanics / Scienza delle Costruzioni”, at the Bachelor of Science (Laurea) Program for the Degree in Architecture, School of Architecture, Urban Planning, Construction, Engineering (www.auic.polimi.it) and “Earthquake Resistant Design” at the Master of Science (Laurea Magistrale) Program for the Degree in Civil Engineering, School of Civil, Environmental and Land Management Engineering (www.ingcat.polimi.it).

He is member of the Board of the PhD Program in Structural, Seismic, Geotechnical Engineering of Politecnico di Milano.

Marco Lepidi

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Marco Lepidi is currently Associate Professor of Solid and Structural Mechanics at the University of Genova, Italy, where he is currently part of the Dicca Department. Marco has been continuously involved in research since 2002. He is currently a member of Research Institutes (INFN), Centres of Excellence (DEWS), and numerous scientific associations and societies (Eacs, EuroMech, Aimeta, Sisco, Aniv, Gades, Gma, Nodys). His main research interests focus on theoretical and applied topics in Structural Dynamics, including linear and nonlinear dynamics of structures, mechanics of periodic microstructured materials and mechanical metamaterials, eigensensitivity and stability analysis of resonant dynamic systems, dynamic identification of physical, modal and damage parameters, vibration control, structural health monitoring and earthquake engineering. Marco participated in several research projects in structural mechanics, funded by national (MIUR-Prin, Reluis-DPC) and private agencies (CarispAq, Compagnia San Paolo). He has been Assistant Editor of the scientific journal Meccanica, and is currently a member of the editorial board for 8 indexed journals (including Coupled Systems Mechanics, Shock and Vibration, Plos One, Frontiers in Materials) and a regular peer reviewer for more than 70 journals. He has also served on the scientific and organizing committees of several national and international conferences. He has more than twenty years of experience in teaching courses in the fields of Solid and Structural Mechanics, Linear and Nonlinear Dynamics and Structural Morphology for undergraduate, graduate and PhD programmes in Architecture and Engineering courses.

Marco has authored or co-authored more than 160 scientific products, including 47 articles published in scientific journals, 11 book chapters, more than 100 contributions in proceedings of international and national conferences.

5 PRACTICAL INFORMATION

VENUE

The conference is held at the historical Faculty of Civil and Industrial Engineering, Sapienza University of Rome, Italy. The whole conference will take place in the hall of the Cloister.

The Faculty is located in the historic center of Rome, next to the ancient Basilica of San Pietro in Vincoli, home to Michelangelo's statue of Moses, and directly overlooking the Colosseum and the Ancient Roman Forum.

REGISTRATION

All attendees of the Conference are requested to check in at the registration desk for the badge assignment. Registration begins at 8:30 on Thursday 15 June at the cloister of the Faculty of Civil and Industrial Engineering. For registration bring with you, either printed or on your smartphone, the ticket received by email. Registration fee includes:

- Attendance at all sessions
- Conference Proceedings
- Luches and coffee breaks
- Gala Dinner

CONFERENCE SECRETARIAT

E-mail: isdac2023@bds.it

WI-FI ACCESS

The Eduroam® international Wi-Fi network is accessible from the workshop venue. For the members of its partner institutions, Eduroam® grants access to the network through the same credential used by the participants at their home institutions.

It is recommended that the participants check on the website of their home institution the possibility of accessing Eduroam® and the details of the accessing procedure.

Further detail about the Eduroam® network may be found here:

https://eduroam.org/what-is-eduroam/

ORAL PRESENTATIONS

Please check the final program to confirm the time of your presentation. The time allocated for each technical presentation is 15 mins, including Q&A. To keep the conference on the schedule, the authors are not able to present using their own devices. The workshop room has a laptop, projector, screen, pointer, and microphone.

The laptop provides Acrobat Reader and VLC. The system runs on Windows, MAC users are encouraged to make sure their presentation is compatible with a Windows PC or convert their presentation into PDF.

Presenters must report to the lecture room 15 mins prior to the start of the session to upload a copy of their presentation from a USB drive onto the computer provided.

COFFEE BREAKS AND LUNCHES

Coffee breaks and lunches are served in the Cloister at the time indicated in the technical program.

Access to lunch and refreshments is granted only to those wearing their own badge.

CONFERENCE DINNER

Gala dinner take place on Thursday 15th evening at Hotel Savoy, Via Ludovisi 15 Roma, 00187. the location is whithin walking distance of the Faculty of Engineering

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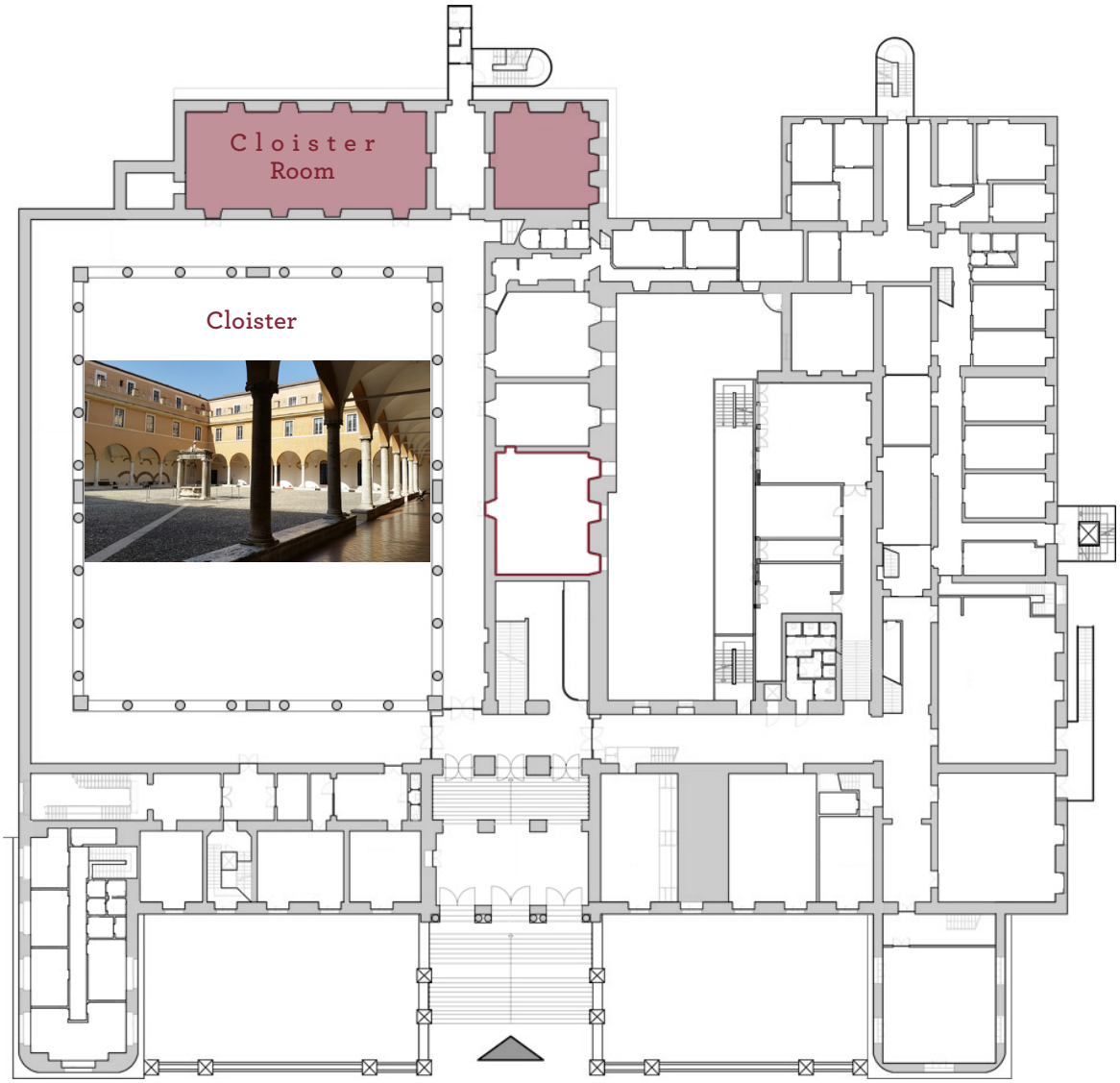
5 FACULTY MAP



Main Entrance

Via Eudossiana 18, 00184 Rome

6 KEYNOTE LECTURES

OPENING LECTURE

Thursday 15th June, 09.45 - Cloister Room

SUSPENSION BRIDGES AND THEIR MAIN CABLES, FROM THE INDUSTRIAL REVOLUTION TO PRESENT

Fabio Brancaleoni

E.D.IN. Ltd, Consulting Engineers, former Full Professor of Structural Engineering

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ABSTRACT

The presentation is devoted to an overview of the development of technologies, materials and methods for the erection of suspension bridges main cables in the contemporary age, from the drive given by the Industrial Revolution to present times. For a wider scenario, fundamental aspects of the conception of suspension bridges in the same period are also outlined. In a first part attention is given to the development of chain bridges and to the transition towards wires as the basic unit for cable forming. The respective roles of the European and of the American civil engineering environments is discussed, with the first pioneers and their works, be them successes or failures. The difficulties in cable erection are described, until the European invention of the aerial spinning technique, which became in turn the premise to the great "American Century" from half Eighteenth to half Nineteenth Century. Of this magnificent period in the history of bridge construction figures of engineers, accomplishments and technical solutions are presented. In a second part, the progress bringing up to present is followed, outlining the respective role of technological and scientific development. Going through the bridges built in the first half of the Nineteenth century, the improvements in cable erection methodologies are commented, with the first bridges built adopting the successful novel approach based on the adoption of prefabricated parallel wire strands (PPWS) and with the subsequent improvements for on-site spinning methods, with the so called modified aerial spinning. These two methods are nowadays dominant in the construction industry, with spiral ropes adopted as a rare and minor exception. As a conclusion, a short brief is given to the overall concepts that allow the possibility of super-long spans, today with the 2023 m of the "1915" suspension bridge on the Dardanelles and with possible larger spans worldwide, such as the know design for a 3300 m span on the Strait of Messina, whose main cable layout is commented, together with some aspects of interest both for future research and innovative engineering solutions.

BIOGRAPHICAL SKETCH

Fabio Brancaleoni was a Full professor of Structural Engineering (Scienza delle Costruzioni), retired in 2019, developed his academic career at the Universities "Sapienza" and "Roma Tre" in Rome, as well as at "G. D'Annunzio", Pescara. In 1977-78 Research Fellow at University of Manchester Institute of Science and Technology.

In his ample teaching activity gave courses of Bridges (Sapienza and Roma Tre), Structural Design, Structures and Materials Mechanics (Roma Tre), Strength of Materials (Roma Tre and D'Annunzio). Before professorship collaborated in courses on Bridges, Structural Dynamics, Theory of Structures, Strength of Materials at "Sapienza" and of Strength of Materials at University of Manchester Institute of Science and Technology.

Author of a vast scientific production, most published internationally, on themes of long span suspension and cable stayed bridges, structural dynamics, identification and structural diagnostics, computational mechanics, seismic engineering. Coordinator or participant in numerous national and international research programmes.

In his professional activity is chartered engineer since 1976. Expert member of the High Council of Public Works and former member of the committee for the preparation of the Italian National Constructions Codes. Well known as consultant or designer for bridges and long span bridge projects, too numerous for a full list: herein some are mentioned, the Messina Crossing in the first place, the second bridge on the Bosporus, the Storebaelt bridge, the Ozman Gazi bridge on the Izmit Bay, the bridge on the Danube at Braila, Romania, to be opened on June 27th, 2023 and recent winner of the prize for the most interesting structure designed by Italian engineers of the Italian Association for Reinforced and Prestressed Concrete. Presently consultant for the design of the Sotra Bridge in Norway, whose construction is scheduled to start in 2024.

1st KEYNOTE LECTURE

Thursday 15th June, 10.30 - Cloister Room

A LEARNING FRAMEWORK FOR PRAGMATIC MANAGEMENT OF THE DYNAMIC PERFORMANCE OF INFRASTRUCTURE ASSETS

Colin Taylor

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ABSTRACT

The dynamic performance of infrastructure assets such as cable-stayed and suspension bridges, guyed masts, and aging nuclear reactor cores, is often complex, intricate and non-linear, with highly uncertain loading conditions and asset properties.

Analysis requires imaginative theorisation and often very large, time consuming computation to explore the performance space.

However, usually, the asset management decision resolves simply to the selection of one option from a small number of viable courses of remedial action. The asset manager only needs parsimonious information from dynamic analysis that is necessary and sufficient, first, to choose the option and, second, to refine and execute the chosen course of action to achieve the desired outcomes at an affordable cost.

This paper describes an outcomes-focused learning framework that helps accelerate progress towards this asset management goal. Based on modern cognitive and learning science, the framework was developed and tested in the context of the seismic performance of aging graphite cores in nuclear power plants, the dynamic performance of the historic Clifton Suspension Bridge, and even customer switching between bank current accounts . The framework is applicable to any kind of outcomes-focused decision making and is valuable for guiding impactful research. The framework principles will be illustrated by reference to typical cable dynamics problems.

BIOGRAPHICAL SKETCH

Colin is Emeritus Professor of Earthquake Engineering at the University of Bristol, UK. He is formerly Head of the Department of Civil Engineering, and Head of the Earthquake Engineering Research Group. He now holds a voluntary position as Policy Fellow for Sub-national Infrastructure Decarbonisation in the Institution of Civil Engineers. He is a Trustee of Brunel's historic Clifton Suspension Bridge in Bristol and a Steering Group member of the South West Infrastructure Partnership (SWIP).

Colin has over 40 years research and practice experience on the resilience of infrastructure systems to natural hazards impacts. His work has covered dams, long span bridges, nuclear power plants, utilities, buildings, geotechnical and smart infrastructure, and banking digital infrastructure problems. His research on the seismic safety of ageing graphite nuclear reactor cores won a prestigious Institution of Civil Engineers Prize in 2017. His research has featured in three Royal Society Summer Science Exhibitions.

Over the last 15 years he has led research into infrastructure as a system of systems from the perspective of how the people who use, create, and operate the systems learn about a system's value and how to collaborate to create and realise this value. The research has led to a novel, transdisciplinary, learning focused, framework that enables people to scaffold their individual and collective learning to best effect. The framework is the foundation for the South West Infrastructure Partnership's novel 2050 Vision and associated Net Zero Route Map. SWIP is the neutral venue for a unique collaboration of infrastructure stakeholders from across the South West of England who are co-producing a very long term strategic vision for sustainable, resilient, decarbonised economic infrastructure in the region.

2nd KEYNOTE LECTURE

Friday 16th June, 09.00 - Cloister Room

EXPLORE ESSENTIAL ELEMENTS IN THE GENERATION MECHANISMS OF WIND-INDUCED CABLE VIBRATIONS: AN INSIGHT OFFERED BY NUMERICAL TECHNIQUES

Shaohong Cheng

Department of Civil and Environment Engineering, University of Windsor

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ABSTRACT

The inclined and/or yawed orientation of bridge stay cables results in the formation of secondary axial flow on the leeward side of cable surface, the intensity of which depends on the effective attack angle between the oncoming wind and the cable axis. On the other hand, although a stay cable is typically modeled as a smooth circular cylinder in many existing studies, the cross-sectional shape of a real stay cable is usually not perfectly round due to surface irregularities of the HDPE tube. It is believed that the presence of axial flow and roundness imperfection would contribute to exciting some unique wind-induced cable vibration phenomena. To clarify their respective role in affecting the flow structure around a cable and have a deeper insight into the physics associated with the excitation mechanisms, a delayed detached eddy simulation (DDES) is performed in OpenFOAM on an inclined circular cylinder. The effect of cable orientation is studied at four effective angles of attack of 0°, 30°, 45°, 60° at Re=1.0×104 and 1.4×104, whereas the impact of cable cross-sectional shape is examined for four different levels of roundness imperfection. Results show that the interaction between the shedding of Kármán vortex and axial vortex causes an "S" pattern movement of a low Cp region along the cable leeward surface, which generated an intermittently amplified transverse lift. This could be the source which triggers unstable motion of a cable. More importantly, it is found that the strength of axial flow is critical to the occurrence of such kind of interaction. Being too strong or too weak would render the absence of either Kármán vortex or axial vortex and thus the vanish of their interaction. This explains why aerodynamic instability of a cable was only observed at certain cable orientations in labs and on site. In addition, an imperfectly round cable is observed to have a smaller recirculation region in the wake, which helps to trap more axial flow close to the cable leeward surface and may enhance its interaction with Kármán vortex.

BIOGRAPHICAL SKETCH

Shaohong Cheng is a professor in the Department of Civil and Environmental Engineering at the University of Windsor, Canada. She specializes in bluff body aerodynamics, fluid-structure interaction, structural vibration and control, and has more than 25 years of experience in these fields. She is a Professional Engineer of Ontario, a member of the American Society of Civil Engineers, the American Association for Wind Engineering, and the International Association for Bridge and Structural Engineering.

She received her early training in Wind Engineering from Tongji University in China, and obtained her Ph.D. degree in Structural Engineering from Carleton University in Canada in 2000, both of which focused on studying wind-induced response of long-span cable-supported bridges. She then worked as a post-doctoral research fellow at the University of Ottawa. She was one of the principal researchers in a collaborative experimental study on wind-induced vibrations of bridge stay cables. The outcomes of this series of wind tunnel tests at the National Research Council Canada have been included in the 5th edition of the Post Tensioning Institute guideline for stay cables and the revision of the wind resistant design manual for highway bridges in Japan. In 2004, she became a senior consulting engineer at Gradient Wind Engineering Inc., in charge of projects associated with wind-induced environmental issues and pedestrian level wind comfort. She joined the Faculty of Engineering at the University of Windsor in 2005.

She is the founder of the Boundary Layer Wind Tunnel Laboratory at the University of Windsor. In recent years, she and her research group are very active in dynamics and aerodynamics of stay cables. She led her team conducted numerous analytical, numerical and experimental studies to explore the role of various factors in the generation mechanisms of wind-induced large-amplitude cable vibrations, and proposed effective passive and semi-active cable vibration control strategies with the implementation of smart dampers and materials. She has published over 100 peer-reviewed journal and conference articles. Three of her journal papers published in the last five years received awards of Key Scientific Articles from Advances in Engineering, and another paper was recognized as the top cited article of 2020-2021 in the prestigious Structural Control and Health Monitoring.

7 SCHEDULE AT GLANCE

THURSDAY 15th JUNE 2023, Cloister Room	
08.30 – 09.15	Registration
09.15 – 09.45	Opening and institutional greetings
9.45 – 10.30	Opening Lecture Suspension bridges and their main cables, from the industrial revolution to present *Fabio Brancaleoni*
10.30 – 11.00	1st Keynote Lecture A learning framework for pragmatic management of the dynamic performance of infrastructure assets *Colin Taylor*
11.00 – 11.15	Coffee break

CABLE STRUCTURES 11.15 - 12.45	
11.15 – 11.30	Novel Position Control for Ensuring Feasible Tension Disribution of Cable-Driven Parallel Manipulators *Andrea Martín Parra, Jorge Munoz, Francisco Moya Fernández, David Rodríguez Rosa, Sergio Juárez Pérez and Concepción A. Monje*
11.30 – 11.45	Kinetostatic Analysis of a Novel Planar Cable-Driven Robot with a Single Cable Loop *Sergio Juárez Pérez, Andrea Martín Parra, Francisco Moya Fernández, David Rodríguez Rosa and Antonio González Rodríguez*
11.45 – 12.00	Dynamic testing of long-span suspension cable net *Robert Soltys, Michal Tomko, Stanislav Kmet and Christos Thomas Georgakis*
12.00 – 12.15	Numerical and experimental study of a slender catenary bridge with a novel tensioning system *Gergely Szabó*
12.15 – 12.30	Filed observations of global and local dynamics of a cable-stayed bridge *Jasna Bogunovic Jakobsen, Jonas Thor Snæbjörnsson and Nicolo Daniotti*
12.30 – 12.45	Implementation of an analytical model in the steel wire rope industry *Muhammad Najih Amin*
12.45 – 14.15	Lunch break

AERODYNAMICS AND NONLINEAR DYNAMICS 14.15 - 17.15	
14.15 – 14.30	Wake galloping suppression in two closely spaced cylinders with surface modification *Thu Dao, Tomomi Yagi, Kyohei Noguchi and Gabriel Mohallem*
14.30 – 14.45	Comparison of observed and simulated galloping responses of a four-bundled conductor under wet snow accretion *Hisato Matsumiya, Saki Taruishi, Hiroki Matsushima and Teruo Aso*
14.45 – 15.00	Statistical Study of Aeolian Vibration Characteristics of Overhead Conductor *Shaoqi Yang, Luc Chouinard, Sébastien Langlois, Josée Paradis and Pierre Van Dyke*
15.00 – 15.15	Three-dimensional Flow Patterns for Yawed and Inclined Circular Cylinders for Bridge Cable-Stays *Michael Hoftyzer and Elena Dragomirescu*
15.15 – 15.30	Propagation of the uncertainty in the dynamic behavior of OPGW cables under stochastic wind load *Damián Campos, Andrés Ajras and Marcelo Piovan*
15.30 – 16.00	Coffee break
16.00 - 16.15	Investigation of ice accretion conditions in observed galloping events of four-bundled conductor *Saki Taruishi and Hisato Matsumiya*
16.15 - 16.30 –	The influence of ice accretion thickness on the aerodynamic behaviour of stay cables *Annick D'Auteuil, Sean McTavish, Arash Raeesi and Krzysztof Szilder*
16.30 – 16.45	Galloping control of single conductors in overhead transmission lines using non-linear energy sink *Matthieu Leroux, Alireza Ture Savadkoohi and Sébastien Langlois*
16.45 – 17.00	Non-linear dynamic response of a small-sag cable model of a guy line of a guyed tower to stochastic wind excitation *Hanna Weber, Anna Jabłonka and Radosław Iwankiewicz*
17.00 – 17.15	Review study on nonlinear modeling issues associated with the dynamics of in-plane cable networks *Luca Caracoglia and Gian Felice Giaccu*

19.30 - 20.00	Walking in the storic center to Savoy Hotel (meeting point at Cloister)
GALA EVENT AT SAVOY TERRACE, 20.00	

FRIDAY 16th JUNE 2023, Cloister Room	
9.00 – 9.30	2nd Keynote Lecture Explore essential elements in the generation mechanisms of wind-induced cable vibrations: An insight offered by numerical techniques *Shaohong Cheng*

MONITORING AND TESTING 9.30 - 11.00	
09.30 – 09.45	Force measurements on flexible sagged cable undergoing forced vibration at a single point *Dániel Dorogi and László Kollár*
09.45 – 10.00	Effect of elastomeric clamp on the fatigue performance of All Aluminum Alloy Conductors *Jose Alexander Araujo, Jorge Luiz de Almeida Ferreira, Remy Kalombo Badibanga and Thiago Barbosa Miranda*
10.00 – 10.15	Wave Propagation-Based Assessment of Damage in Laboratory Samples of a Cable *João Rodrigues, Elsa Caetano, Carlos Moutinho and Raphael Mendonça*
10.15 – 10.30	An Experimental Assessment of Damping Property of Different SMA Wires in Mitigating the Oscillation of a Taut Cable *Sourabh Rajoriya and Prof. Shambhu Sharan Mishra*
10.30 – 10.45	Full-size testing of stay cable damping for the assessment of viscous damper efficiency *Max Vollmering and Werner Brand*
10.45 – 11.00	Vibration Excitation and Damping of Suspension Bridge Hanger Cables *Allan Larsen*
11.00- 11.30	Coffee break

IDENTIFICATION AND CONTROL 11.30 - 13.30	
11.30 – 11.45	Stability and nonlinear resonant responses of suspended cables with a longitudinal time-delay feedback control *Jian Peng, Hui Xia, Hongxin Sun and Stefano Lenci*
11.45 – 12.00	Bayesian identification of the axial forces, the bending stiffnesses and the connecting point in crossed cables *Davide Piciucco, Francesco Foti, Vincent Denoël, Thierry Auguste, Sébastien Hoffait, Margaux Geuzaine*
12.00 – 12.15	Comparison of fatigue lifetime estimation of a conductor based on a standardvibration device and other structural health monitoring system sensors *Raphael Mendonça, Elsa Caetano, João Rodrigues, Omar Saadi and Carlos Moutinho*
12.15 – 12.30	Comparing different techniques of determining cable forces from vibration measurements on a cable-stayed arch bridge *Stefan Verdenius*
12.30 – 12.45	A numerical investigation on the dynamic response of short slack cables
12.45 - 13.00	On the assessment and mitigation of vortex-induced-vibrations of overhead electrical conductors *Francesco Foti and Luca Martinelli*
13.00 - 13.15	Vibration suppression of long stay cable by using mechanical dampers enhanced with negative stiffness *Limin Sun and Lin Chen*
13.15 - 13.30	Cable-stayed bridge model updating through analytical formulation, finite element model and experimental measurements *Cecilia Rinaldi, Marco Lepidi, Francesco Potenza and Vincenzo Gattulli*
13.30 - 15.00	Lunch break

MODELS 15.00 - 16.30	
15.00 – 15.15	On the seismic response of anchoring elements for Submerged Floating Tunnels *Stefano Corazza, Margaux Geuzaine, Francesco Foti, Vincent Denoel and Luca Martinelli*
15.15 – 15.30	Application of analytical models into steel wire rope industry *Maurizio Meleddu and Muhammad Najih Amin*
14.30 – 14.45	3D finite element modelling of conductor-clamp assemblies under cyclic bending: Sensitivity analysis of wire contact coefficient of friction *Lalonde Sébastien, Raynald Guilbault, Lititia Kared and Sebastien Langlois*

14.45 – 15.00	Numerical characterization of overhead conductor local loading conditions at wire contact points in the vicinity of suspension clamps *Lititia Kared, Sébastien Lalonde, Sébastien Langlois and Raynald Guilbault*
15.00 – 15.15	Evaluating contact stresses in multilayer stranded cables with finite element models using submodelling techniques *Sascha Jabornegg, Ralf Baumann, Sebastien Langlois and Pedro Henrique Correa Rocha*
15.15 – 15.30	General modelling of cable vibrations using data extracted from physical simulation *John Redford, Maxime Gueguin, Hafid Fikri, Matthieu Ancellin and Jean-Michel Ghidaglia*
15.30 – 15.45	Development of a numerical tool to evaluate the vibration response of a bundle conductor equipped with spacer-damper *Shima Zamanian, Sébastien Langlois and Daniel Kubelwa*
15.45 – 16.00	Parametric Dynamic Modeling of Cable-Driven Parallel Manipulators *Andrea Arena, Erika Ottaviano and Vincenzo Gattulli*
16.00 - 16.15	Catenary solutions for inextensible cables: a high-order perturbation-based approximation *Marco Lepidi*
CLOSING CEREMONY 16.15 - 16.30	

8 GALA EVENT

THURSDAY 15th JUNE, 20.00 - 24.00

19.30

The conference attendees, guided by the ISDAC staff members, by walking in the center of Rome, will reach Hotel Savoy, Via Ludovisi, 15 Roma 00187.

GALA DINNER AT HOTEL SAVOY

The Gala Dinner will take place in Hotel Savoy, an elegant palace in the heart of Rome, that attempts with its panoramic terrace: a roof garden with an amazing view on Rome.

The location itself is on the corner with well-known Via Veneto, meeting point for actors, VIPs and intellectuals at the time of "Dolce Vita". Ava Gardner, Burt Lancaster, and the beautiful Liz Taylor: these are just some names still sounding around the building. Many Hollywood producers chose this street as setting for their movies. Fellini made it famous, even if it was not exactly the set, as Via Veneto was created in Cinecittà. The area is elegant and quiet, safe and well connected.

It is only a five-minute walk from the Hotel to get to Villa Borghese, the green heart of Rome, and Piazza Barberini, one of the most famous in town.

It only takes ten minutes to reach the Spanish Steps and the amazing Piazza di Spagna; with just a few minutes more the Trevi Fountain, Piazza del Popolo and the Pantheon.

9 SOCIAL AND CULTURAL PROGRAMME

Thursday 15th June, 20.00 - 24.00
GALA EVENT

Friday 16th June, 17.00 - 19.00
MICHELANGELO'S MOSES FREE GUIDED TOUR

Saturday 17th June, 10.00 - 12.00

CULTURAL VISIT

Guided visit to Rome's Botanical Gardens, Trastevere

Entrance fee 8€

Rome's Botanical Gardens offer a wonderful escape from the city's bustling streets.

Dating back to 1883, it is now run by the Department of Environmental Biology of Sapienza University of Rome. Part of the current Botanical Garden used to be the private garden of the Palazzo Corsini.

The garden boasts a Rose Garden, a Medical Garden, 19th century greenhouses, a Japanese Garden designed by Ken Nakajima in 1993, as well as home to 60 different types of coniferous trees, including sequoias and pines, and 35 different types of palm trees.

Saturday 17th June, 14.00 - 16.00

CULTURAL VISIT

Visit to Journeys through Ancient Rome, Forum of Augustus

Ticket 11€

For further information visit the website:

Please reserve your participation sending an email to: isdac2023@bdst.it
Payment will be finalized at Conference desk.

10 SPONSOR

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Its specialists know what matters in connection with every application and are therefore able to provide you with a clear product recommendation. Every single application requires a specific, custom-tailored solution.

Rotation-resistant and non-rotation-resistant high-performance steel wire ropes from Teufelberger-Redaelli are used for a variety of applications such as heavy-duty lifting applications in construction, cargo handling in harbors and on ships, and in industrial niches, cranes in offshore and onshore oil exploration, mining, ropeways for the transport of passengers and goods, forestry cranes and winches, personal protective equipment against falls from a height.

Four manufacturing sites for steel wire ropes and a combined total of more than 425 years of rope-making experience tally up to a unique wealth of expertise and an unmatched and proven production standard.

BEST DESIGN

BEST Design (Bim Engineering STart-up) is an innovative startup of Sapienza University of Rome that operates in the field of digital evolution in the construction sector, offering support to Public Administrations, property managers and professional structures for the configuration of systems and processes enabled by digital technologies oriented to BIM in compliance with sector regulations, in order to manage information processes related to the built environment: from conception, design, construction, maintenance.

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The LST Group has a client portfolio made up of important private and cooperative companies. It provides constant collaboration with strategic companies such as Anas Spa, Spa Autostrade, Italferr Spa, Provinces, Municipalities and various public society. The peculiarity of the services provided by LST represents their unparalleled strength. These services include a request for action, followed by an on-the-spot visit by specialised technicians for the timely verification of the status of the sites and the subsequent planning of the work. The constant attention in the search of equipment of vanguard, the formation of the specialized staff, and the thirty years experience have contributed to the affirmation of the societies of the group LST as leader in the field: Techno-Lab in Altamura, Geotechnological laboratory in Parma, Technological laboratory in Modena, ASM laboratory in Turin.

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ISDAC2023 - 3rd International Symposium on Dynamics and Aerodynamics of Cables
Faculty of Civil and Industrial Engineering, Sapienza University of Rome, Italy
June 15-17, 2023