ISSN 2517-8008
THE SOCIETY FOR EARTHQUAKE AND
CIVIL ENGINEERING DYNAMICS

NEWSLETTER

Volume 35 No 1
February 2024

In this issue

Editorial Introduction 2

Reporting from the SECED 2023 Conference 3

Best Paper Awards 8

Notable Earthquakes August 2023 – December 2023 9

Forthcoming events 11

SECED 2023 Conference: Earthquake Engineering & Dynamics for a Sustainable Future

Editorial Introduction

Damian Grant
SECED Newsletter Editor

A highlight of 2023's calendar of SECED activities was September's conference in Cambridge. In this issue of the newsletter, I invited conference organisers and session chairs to contribute personal reflections on the conference itself and the sessions they were responsible for. In the following pages, you'll find further thoughts from me about the conference overall, a perspective from the current SECED chair, Andreas Nielsen, and feedback from four of the conference sessions. All the papers referred to in these summaries are available on the SECED website at: https://seced.org.uk/index.php/seced-2023-proceedings. Note that you can download individual papers through the various links on the page, or (for the completists) you can download all papers in one zip file for offline perusal.

Thanks to all those who contributed their thoughts, and all those who made the conference a success, including of course the conference sponsors. And thanks, as usual, to the team of sub-editors, especially Maria Liapopoulou, for putting together this issue of the newsletter.

Photo of the conference dinner at Georgian Gothic Hall of King's College Cambridge.

Reporting from the SECED 2023 Conference

Damian Grant
Arup, London

In what is becoming an exciting tradition, SECED's 2023 conference in Cambridge was a resounding success. In each of the SECED conferences of the modern era (2015 in Cambridge and 2019 in Greenwich), I have been pleasantly surprised at the draw of SECED's event, including an engaging mix of academics and practitioners, UK-based and international, and diverse specialities within our broad discipline. Ahmed Elghazouli (conference chair) and Andreas Nielsen (SECED committee chair) reminded us in their kick-off presentations just what an uncertain world we were in during the early conference planning, when in-person events with hundreds of attendees seemed improbable and possibly unwise!

Keynote presentations at eclectic conferences like this one have to cover a lot of bases, and perhaps the ultra-specialists amongst us are less likely to be engaged in all of them. It was therefore a timely reminder from the first keynote speaker, SECED's own Andy Mair, of The Need for a Controlling Mind in Seismic Engineering – that is, someone who can create a coherent story out of the specialists' input on a project, and ensure that major clangers do not fall through the cracks between the disciplines. It was pertinent that one of Andy's examples – on the directionality of ground motions, and how this is interpreted differently by seismic hazard analysts and structural engineers – returned to the keynote stage in Professor Eduardo Miranda's presentation, another personal highlight for me. In fact, only after Professor Miranda put up his first few slides did I remember that I'd written him a fan e-mail for his definitive 2022 paper on the topic in Earthquake Spectra. Another keynote highlight was of course introducing my friend, Professor Dimitrios Vamvatsikos, and hearing his long-awaited (and hilarious) keynote on Stranger Things in Seismic Response and Statistical Tools to Resolve them. Personal highlights aside, I thought all the keynote presentations were excellent, and the fact that several people I've spoken to have nominated different favourites goes to show that most bases were covered.

The oral technical sessions and poster presentations kept up this strong diversity of topics. For the generalist, multiple sessions can lead to some agonising choices over what to see and what to miss. In hindsight, I'm disappointed not to have attended the session on the Turkey and Syria earthquakes (no offence to those I attended in its place!), which was standing room only, and gave an important reminder of why we continue to do what we do. In write-ups of the past conferences for the SECED newsletter, I've tried to draw out some overarching themes from the technical presentations, and, as usual this is challenging! Continuing a trend from previous conferences, there is increasing emphasis, particularly from the research community, on statistical methods and development of fragility and vulnerability functions for buildings and other structures. The relevance of this field of work in insurance and other quantitative risk assessments is self-evident, but I wonder the extent to which fragility and vulnerability considerations will find their way into seismic design and retrofit practice? I would have expected more emphasis on machine learning and artificial intelligence, although perhaps we were all heeding Professor Vamvatsikos' warning about venturing too far into The Upside Down.

And once again, I'm reminded of the value in bringing together the diverse bunch of individuals and institutions that make up the SECED community together. Drawing lessons from other industries is often fruitful. For example, Irmela Zentner's keynote presentation was based on her work in the nuclear industry, but I believe it also contained a useful framework (based on Bayesian statistical approaches) to making rational use of all the types of data we as engineers need to use on our projects (judgement and experience, empirical data and analytical modelling). Recognising these synergies, while not losing sight of what is important for project success (e.g. Andy Mair's Controlling Mind), is perhaps one route to an engaging and varied career progression in our field.

Andreas Nielsen
AtkinsRéalis, Glasgow

The preparations for the SECED 2023 Conference began in May 2021. At that time, the COVID-19 pandemic had brought about significant changes to daily life in the UK. The vaccination campaign had been launched, and societal restrictions were gradually being relaxed. However, the way we approached work and education had changed, and online meetings had become much more prevalent. Therefore, when the Organising Committee met for the first time, one of the first decisions we had to make concerned the overall format of the conference: should SECED 2023 be an in-person, online or hybrid event? We soon decided in favour of an in-person event. We recognised that this would be a gamble, but we considered that the benefits of in-person events far outweighed the risks of low attendance, or even cancellation. As it happened, the coronavirus never went away, but by early spring 2022, the last societal restrictions were lifted, and a "new normal" was settling in. As a result, we pressed ahead.

Organising the SECED 2023 Conference was a collective

effort and responsibility, shared by many people. The main driving force was the Organising Committee, headed by Prof. Ahmed Elghazouli. We hired a professional event management company, Hg3, to assist us in the preparations. However, even with professional help, the Organising Committee faced a diverse set of challenges and hurdles. One of the primary hurdles was securing a suitable venue for the conference. We eventually decided on Cambridge due to the excellent facilities available there, and because it is easily accessible from London.

Another significant challenge was coordinating the abstract and paper review process. Nearly 230 abstracts were submitted for the conference. The abstracts were reviewed by the Scientific Committee, a large group of academics and practitioners who had volunteered for this purpose. About 150 of the abstracts were converted into papers, which also had to be reviewed. In addition, we had 8 keynote papers. Some submissions were late, and others were modified along the way. Managing this process required a robust and yet flexible system.

One crucial lesson from organising the conference was the value of effective communication. Clear and consistent communication among the Organising Committee, presenters, attendees, and sponsors was essential for the success of the event. However, communication can be difficult to manage when responsibility is shared between many people. In the end, I counted more than 800 sent and received emails in the Outlook folder I had dedicated to the conference.

Conference organisation requires just the right mix of flexibility and rigidity. Unexpected issues can arise, such as technical difficulties during presentations or last-minute cancellations. Having a contingency plan in place and being adaptable to changes on the fly is important for success. On the other hand, consistent adherence to terms and conditions and attention to the "small print" in contracts is also vital.

One of the most important aspects of the conference was the networking and social opportunities. We discovered that providing ample time for attendees to connect with each other and with the exhibitors was a key factor in enhancing the overall experience. An enjoyable conference dinner creates lasting memories for attendees, which will encourage repeat attendance, and word-of-mouth recommendations.

Ultimately, organising the SECED 2023 Conference in Cambridge was a valuable experience that taught me the importance of careful planning, clear communication, adaptability, and the significance of fostering a sense of community among participants. At this point in time, SECED has had three successful conferences in a row (2015, 2019 and 2023). I tentatively look forward to the next conference, which will take place in 2027, if we follow the current pattern of quadrennial events, and I wish the organisers of that conference the best of luck. Maybe I will even volunteer again!

Guillermo Aldama-Bustos
Jacobs, London

At the recent SECED 2023 Conference I had the pleasure of chairing, along with my colleague Sarah Tallett-Williams, the two sessions on Seismic Hazard and Engineering Seismology, both held on the first day of the conference. I was happily impressed with the technical quality of the presentations as well as the questions contributions from the attendees.

The morning session was dedicated mainly to recent developments in the UK. The presentations could be classified in two main topics: the use of ground-motion data, from a downhole array (Ktenidou et al., 2023; Tallett-Williams et al., 2023) and the BGS seismic network (Mosca et al., 2023b), to reduce uncertainties on the ground-motion predictions from existing, usually foreign, models; and insights of the early stages of the ongoing development of two ground-motion models (commonly known as ground-motion prediction equations), developed by two independent teams, for the UK (Douglas et al., 2023; Mosca et al., 2023a). Additionally, in this morning session, we had a very interesting presentation on the implementation of directivity effects in probabilistic seismic hazard analysis using as a case example the seismic hazard maps for New Zealand (Weatherill and Lilienkamp, 2023).

The topics covered by the morning presentations are a clear reflection of an increased interest in a better understanding of the ground-motion attenuation in the UK, which is well known to be the largest contributor of epistemic uncertainty in probabilistic seismic hazard analysis. This has been driven mainly by the nuclear industry as they look to build new seismic resistant infrastructure and review the safety case justification for the existing fleet. Personally, I'll be looking forward to the outcome of the two ground-motion models and their potential in the hazard estimates for the UK.

The afternoon session was dedicated to presentations focused on the seismicity and seismic hazard of other regions in the world. We could say that we had a good global coverage with presentations on the seismic hazard for France (Hashemi et al., 2023) to the political, sociological and seismic hazard aspects associated with recent developments on the characterisation of the San Ramón fault in Santiago de Chile (Domínguez and Heresi, 2023; Rivera et al., 2023), to the evaluation of ground-motion predictions in Istanbul using data from a dense urban network (Malcioglu and Safak, 2023), and the seismic hazard assessment of 500 sites across the world using OpenQuake Engine (Villani et al., 2023). The afternoon session closed with a thought-provoking presentation on the use of Monte Carlo ground-motion simulations to assess probabilistic seismic hazard risk (Rudman et al., 2023).

During this afternoon session, the discussion was mainly driven by the two presentations on the San Ramón fault

in Santiago de Chile which addressed the same topic (i.e. new information on what had been a relatively unknown geological structure until recent times) from two very different perspectives, the political and sociological aspects of a seismogenic fault in a densely populated area, and the technical/engineering aspect which addressed potential changes to the seismic design parameters currently considered in the seismic code for Chile.

Overall, the SECED 2023 Conference was an enjoyable experience, not only in terms of a good learning opportunity from a number of high-quality presentations, including all keynote speakers, but also a great opportunity for networking and keeping in touch with old colleagues which otherwise would be difficult to meet. Already looking forward to the next one.

Chris Pearce
AtkinsRéalis, Surrey

The SECED 2023 conference, held in the picturesque grounds of Churchill College, Cambridge, was a resounding success. The conference featured a series of valuable keynote presentations by leading experts, and oral sessions and poster presentations covering a variety of topics in structural dynamics and earthquake engineering.

I had the privilege of co-chairing the Blast, Impact, and Vibration session alongside Piroozan Aminossehe. The quality of the presentations, and participation by the audience with their insightful questions, certainly turned the experience into one of the conference highlights for me. The session featured a number of interesting presentations, for which I thoroughly recommend searching out their papers in the conference proceedings.

- Sam Rigby – Can Fractals Mitigate Blast Loading? (Rigby et al., 2023)
- Lewis Tetlow – Probabilistic Analysis of the Response of Plates Subjected to Near-Field Blast Loading (Tetlow et al., 2023)
- Adam Dennis – Prediction of Blast Loads Using Artificial Neural Networks (Dennis and Rigby, 2023)
- Moahamed Esaker – Experimental Investigation on Textile Reinforced Concrete (TRC) Panels under High-Velocity Impact Loading (Esaker et al., 2023)
- Mohamed Elzeadani – Rate-Dependent Cyclic and Impact Properties of Rubberised Alkali-Activated Concrete (Elzeadani et al., 2023)
- Konstantinos Bakalis – Footfall Induced Vibrations on Steel-Concrete Composite Floors: Serviceability Performance under Walking Load Uncertainty (Bakalis and Kazantzi, 2023)
- Lucas Green – An Investigation into the Dynamic Response of High-Rise Buildings to Festival Induced Vibrations (Greeen et al., 2023)
- Luca Possidente – Numerical Investigation of Retrofit Measures to Mitigate Progressive Collapse in Steel Structures (Possidente et al., 2023)

These presentations covered a wide range of topics, from blast prediction and mitigation, to the vibration of high-rise buildings as a result of festivals. The session was well-attended and generated a lively discussion among the audience.

The SECED conference is a valuable event in the UK engineering calendar, and is highly recommended for staying up-to-date with latest developments in the broad and interesting field of earthquake engineering and structural dynamics. It provides a platform for academics, practitioners, and students to come together and share their knowledge and expertise. The conference is also a great opportunity to network with colleagues in the technical community.

I would like to thank the SECED conference committee for organising this event, and very much look forward to attending the next one!

Marco Baiguera
University of Southampton, UK

Ahsana Parammal Vatteri
University College London, UK

We had the pleasure of chairing the session titled "Multi-Hazard, Low Carbon and Climate Resilience of Built Infrastructure". Sponsored by Arup, the session showcased a total of eight high-quality presentations covering emerging areas in the fields of civil and earthquake engineering. The topics can be summarised as follows: development of low-carbon low-damage design technologies in developed and developing countries (Bianchi et al. and Kaminski et al., respectively); multi-hazard design frameworks combined with life-cycle analysis (Franchini and Galasso, 2023; Iannacone et al., 2023; Otarola et al., 2023); resilience frameworks considering climate change impacts and cascading effects (Gonzalez-Duenas et al., 2023); and structural assessmentof buildings exposed to multiple hazards, ie. earthquake and fire (Dede et al., 2023), earthquake and flooding (Parammal Vatteri and D'Ayala, 2023). The topics of discussion varied from innovations at single asset level to holistic system frameworks, showcasing the range of avenues for engineering interventions to improve hazard-resilience of built infrastructure. It was particularly interesting to observe the nuances of multi-hazard resilience assessment being handled at multiple stages, such as the hazard interaction and at the impact interaction.

These contributions proposed innovative and exemplar solutions that aim to address pressing challenges for our

society and opened up a lively discussion throughout the technical session. This reflected the growing interest of our community in understanding what we can propose to improve the resilience of the built environment to multiple natural hazards and to optimise the design of buildings and infrastructures by accounting for the effects of multiple hazard and embodied carbon footprint. It was a very timely session, for which we thank all the speakers and attendees. We look forward to hearing even more about

Dan Bompa
University of Surrey, UK

Enrico Tubaldi
University of Strathclyde, UK

The SECED Conference held at Churchill College provided a unique blend of ground-breaking seismic engineering research and practice in a modernist architectural design setting. As the joint chairs for the Resilient Steel Structures and Seismic Design Methodologies session, we had the privilege to listen to a total of eight talks of excellent quality. The presentations covered diverse areas from risk-based methodologies for seismic assessment and design, to focused experiments and simulations, showcasing the forefront of research and advancements in the field.

Grouped by topics rather than session order, the first paper (Gentile, 2023) introduced the direct loss-based seismic design approach, a recent development enabling the efficient design of regular structures to achieve specific loss-related metrics under site-specific seismic hazards with minimal iterations. The presentation sparked a very interesting discussion on the applicability of such methodology to real-life problems, where criteria of regularity are not often met, and several architectural constraints have to be considered. In a similar area as the first paper, a methodology was proposed for the risk-based design of bridges (Turchetti et al., 2023). This methodology solves an optimisation problem aimed at minimising the construction costs while controlling the risk of bridge failure.

On current or next generation design codes, presentations covered the evaluation of various seismic performance factors of steel, concrete or hybrid structures for civil and defence applications. It was shown that for steel moment frames designed to the revised Eurocode 8, it becomes more demanding to satisfy the column design requirements, while the second-order effects are usually less critical (Liapopoulou et al., 2023). For reinforced concrete frame buildings with different levels of setback irregularity it was indicated that ductility demands may not comply with the ductility capacity established by the current European seismic design code (Fonseca Mojica, 2023).

Elsewhere, nonlinear research on an innovative self-centring hybrid coupled wall system for building structures, confirmed the efficiency of using the proposed system in minimizing the earthquake-induced residual deformations and the superior performance of the proposed lateral load-resisting system, which would unlock the resilient-based design of structures (Farahi et al., 2023). Finally, a focused numerical study evaluated the seismic bearing capacity for defence building infrastructure applications and suggested modifications to the current Eurocode 8-5, in line with the future codification directions (Jaen Toribio and Wang, 2023).

Two papers covered the performance of steel connections either through experimental or non-linear numerical research. A study on reduced web section connections with demountable slabs highlighted their role as possible ductile fuses, providing a promising and straightforward choice for seismic requirements (Almutairi et al., 2023). The ultimate response characteristics of steel reduced beam section connections with jumbo sections, was covered in another paper, offering detailed insights into the local failure mechanisms including likelihood of fracture, and suggestions for prequalification (Bompa et al., 2023).

We are grateful to have had such a diverse suite of outstanding research in the session we have chaired. We are also pleased to note that most of the speakers presented within their allotted time, which allowed for questions and interaction between the presenter and the audience. The discussions after each presentation were engaging, and with a good level of positive criticism in some cases. The session finished right on time to attend the awards ceremony. The overall standard of presentations was commendably high, with a well-balanced presence of early career researchers and more established academics/practitioners.

In addition to the keynotes and technical presentations in parallel sessions, the conference was also about the personal contacts and networking made during break-out sessions, adding an invaluable dimension to the conference experience. The conference was a genuine success, a testament to the hard work of the organisers, which were able to attract an international community of experts, across disciplines and all focused on providing solutions to a problem that still poses many challenges. It was an event to remember, thanks to everyone who contributed to its success. We look forward to the next SECED conference!

References

All references in the contributions cited above are from SECED 2023 Conference and are available online at https://www.seced.org.uk/index.php/seced-2023-proceedings.

Almutairi, F. F., Tsavdaridis, K. D., & Alonso-Rodriguez, A. (2023). Hysteretic performance of Reduced Web Section (RWS) connections with demountable slabs

and effect of composite action.

Bakalis, K., & Kazantzi, A. (2023). Footfall induced vibrations on steel-concrete composite floors: serviceability performance under walking load uncertainty.

Bianchi, S., Ciurlanti, J., Overend, M., & Pampanin, S. (2023). Low-carbon & low-damage technologies for improving the resilience of buildings.

Bompa, D. V., Elghazouli, A. Y., Bogdan, T., Eatherthon, M. R., & Leon, R. T. (2023). Ultimate response characteristics of steel RBS connections with jumbo sections.

Dede, S., Rossetto, T., & Freddi, F. (2023). Seismic performance of fire-damaged structures: preliminary analysis of a 14-story case study structure.

Dennis, A., & Rigby, S. (2023). Prediction of blast loads using artificial neural networks.

Domínguez, R., & Heresi, P. (2023). Seismic hazard assessment of the San Ramón fault in Santiago, Chile.

Douglas, J., Strasser, F., Aldama-Bustos, G., Tallett-Williams, S., Daví M., & Tromans, I. J. (2023). Development of a suite of stochastic ground-motion models for the United Kingdom.

Elzeadani, M., Bompa, D., & Elghazouli, A. (2023). Rate-dependent cyclic and impact properties of rubberised alkali-activated concrete.

Esaker, M., Thermou, G., & Neves, L. (2023). Experimental investigation on textile reinforced concrete (TRC) panels under high-velocity impact loading.

Farahi, M., Freddi, F., & Latour, M. (2023). Seismic design of an innovative self-centring hybrid coupled wall system: an eight-story case study building.

Fonesca Mojica, C. (2023). Design and assessment of seismic behaviour of structures irregular in elevation.

Franchini, A., & Galasso, C. (2023). Seismic optimisation of cable-stayed bridges based on expected annual loss and embodied carbon.

Gentile, R. (2023). Advancements and challenges in direct loss-based seismic design.

González-Dueñas, C., Cremen, G., & Galasso, C. (2023). A novel framework for assessing multi-hazard risk and resilience in a changing world.

Green, L., Rossetto, T., Dede, S., Denton, P., Cels, J., & Hammond, J. (2023). An investigation into the dynamic response of high-rise buildings to festival induced vibrations.

Hashemi, K., Benjelloun, Y., Maharjan, S., Poujol, A., Ameri, G., Baumont, D., & Martin, C. (2023). A comparison of recent seismic hazard models covering France developed at different scales.

Iannacone, L., Gentile, R., & Galasso, C. (2023). Modelling multi-hazards interactions in life-cycle analysis of engineering systems.

Jaen Toribio, A., & Wang, J. (2023). Seismic bearing capacity – recent advancements in code and practice.

Kaminski, S., Lopez, L. F., Trujillo, D., Zea Escamilla, E., Correa-Giraldo, V., Correal Daza, J. (2023). Composite bamboo shear walls – A shear wall system for affordable and sustainable housing in tropical developing countries.

Ktenidou, O. J., Pikoulis, E. V., & Aldama-Bustos, G. (2023). Attenuation at the UK's first downhole array.

Liapopoulou, M., Stafford, P J., & Elghazouli, A. Y. (2023). Comparative assessment of steel moment frames designed to Eurocode 8.

Malcioglu, F. S., & Safak, E. (2023). Consistency evaluation of ground motion prediction equations with strong motion records from dense urban network of Istanbul.

Mosca, I., Baptie, B., Fowler, R., & Stafford, P. (2023a). Preliminary results on the development of an adjustable backbone approach for ground motion prediction within the UK.

Mosca, I., Luckett, R., & Baptie, B. (2023b). Comparing observed and modelled ground motions using adjustments for specific sites in the UK.

Otárola, K., Iannacone, L., Gentile, R., & Galasso, C. (2023). Accounting for damage accumulation in multi-hazard life-cycle consequence analysis.

Parammal Vatteri, A., & D'Ayala, D. (2023). Fragility assessment of confined masonry buildings exposed to sequential flood and seismic hazards.

Possidente, L., Freddi, F., & Tondini, T. (2023). Numerical investigation of retrofit measures to mitigate progressive collapse in steel structures.

Rigby, S, Isaac, O., Alshammari, O., & Clarke, S. (2023). Can fractals mitigate blast loading.

Rivera, F., Rossetto, T., Twigg, J., Cembrano, J., De La Llera, J. C., Crempien, J., & Freddi, F. (2023). The politics of crustal faults: Issues and controversies around the San Ramón fault in Chile.

Rudman, A., Douglas, J., & Tubaldi, E. (2023). Using ground-motion simulations within a Monte Carlo approach to assess probabilistic seismic risk.

Tallett-Williams, S., Tromans, I. J., Aldama-Bustos, G., Lessi-Cheimariou, A., & Strasser, F. (2023). Analysing recordings from the UK's first vertical borehole array to aid calibration and verification of the 1D site response and vertical component models used at Bradwell B.

Tetlow, L., Rigby, S., Langdon, G., Tyas, A., & Pezzola, G. (2023). Probabilistic analysis of the response of plates subjected to near-field blast loading.

Turchetti, F., Tubaldi, E., Douglas, J., Zanini, M., & Dall'Asta, A. (2023). A methodology for the risk-based design of bridges in Italy.

Villani, M., Johnson, K., Pagani, M., Luco, N., & Kortum, Z. (2023). Risk-targeted maximum considered earthquake ground motion calcultions for 500 locations using the OpenQuake Engine.

Weatherill, G., & Lilienkamp, H. (2023). Modelling directivity in probabilistic seismic hazard analysis: Examples from New Zealand and application to complex fault ruptures.

Best Paper Awards

Congratulations to Jonathan Ciurlanti and to Miguel Martínez Pañeda for receiving respectively the Best Industry Paper Award and the Best Research Paper Award at the SECED 2023 Conference 'Earthquake Engineering & Dynamics for a Sustainable Future'. The judging panel praised Jonathan and Miguel's papers as some of the most impactful contributions submitted by Young Authors. Big Congratulations to the winners!

Sensitivity Analysis and Risk Assessment of Unitised Glass Curtain Wall

Jonathan's paper is entitled: 'Sensitivity Analysis and Risk Assessment of Unitised Glass Curtain Wall'. It is an industry-led work done in collaboration with Arup, Permasteelisa Group, and Delft University of Technology. The abstract is provedied below, while the full paper can be accessed through: https://www.seced.org.uk/index.php/seced-2023-proceedings/70-non-structural-components-and-design-codes/853-sensitivity-analysis-and-risk-assessment-of-unitised-glass-curtain-walls.

Unitised glass curtain walls are pre-assembled façade systems broadly used in the construction industry, especially for mid-to-high rise buildings, due to their advantages in terms of quick installation, quality control and overall performance. However, glass façades are not adequately designed for seismic loads despite the fact that they usually represent one of the largest portions of the capital investment of a building. Recent earthquake disasters have highlighted the vulnerability of these components, which can result in loss of functionality, severe direct and indirect economic losses, and human injury / loss of life for building occupants and pedestrians. Although research studies have focused on improving the seismic performance of glass façades and assessing their dynamic behaviour through experimental testing, numerical modelling for more accurate simulations remains limited and further research is needed. This paper presents an advanced numerical model of a whole façade system (including frame, glass, and connections) using LS-DYNA, which is able to capture the complex behaviour of the façade components and joints. The model is validated against full-scale experimental results from quasistatic cyclic tests carried out at the laboratory of Permasteelisa Group in Vittorio Veneto (Italy). After the initial validation of the numerical approach, a sensitivity analysis is performed for assessing the influence of different façade design parameters on the seismic response, e.g. the variation of material properties (e.g., frame stiffness and strength) and construction details (e.g., structural silicone bite). Finally, damage fragility curves based on the inter-storey drift ratio are derived using cloud analysis. The results demonstrate the high correlation between the seismic performance of the façade and its design parameters, such as the structural silicone bite.

Novel Large Mass Damping Approached for Efficient Tall Building Design

Miguel's research paper is entitled: 'Novel Large Mass Damping Approaches for Efficient Tall Building Design', co-authored with Professor Ahmed Y. Elghazouli. The abstract is given below, while the full paper link is: https://www.seced.org.uk/index.php/seced-2023-proceedings/64-dampers-and-innovative-seismic-protective-systems/796-novel-large-mass-damping-approaches-for-efficient-tall-building-design.

Traditional approaches for the design of tall buildings under wind and earthquake loads are widely recognized to result in less efficient and resilient solutions when compared to modern techniques involving the use of supplementary damping systems. To this end, the benefits associated with mass damping systems versus alternative arrangements are being increasingly explored, not just to mitigate wind-induced response, for which they are the reference approach, but also to control seismic behaviour. This is even more the case for redundant and large mass approaches that can result in improved dynamic response. This paper introduces a new generation of large mass damping systems which utilizes the own mass of the building as the damper mass. A usable portion of the building is allowed to experience minimum differential displacements with respect to the lateral-load resisting system. These movements are controlled via a series of springs to resist static loads, in parallel with fluid viscous dampers to control accelerations and dissipate energy. The performance of the system is investigated under both wind and seismic excitations for a series of target differential displacements and key performance indexes. The results show, that due to the large-mobilized mass, the system can generate significant levels of supplementary damping and, in turn, results in a drastically improved seismic response in all the performance indexes considered. With the benefits associated with mass damping systems, the proposed arrangement permits a new generation of tall buildings with an enhanced dynamic performance that can result in substantial savings for the overall structure as well as at substructure levels. Its implementation significantly reduces the carbon footprint of tall buildings and thus maximizes their positive contribution to urban infrastructure and contributes to the move towards a holistic Net Zero approach.

Notable Earthquakes
August 2023 – December 2023

Reported by British Geological Survey

Issued by: Davie Galloway, British Geological Survey, February 2024.
Non British Earthquake Data supplied by: United States Geological Survey.

Year	Day	Mon	Time UTC	Lat	Lon	Dep km	Magnitude ML	Mb	Mw	Location
2023	11	AUG	11:25	51.04N	2.83W	8	1.8			LANGPORT, SOMERSET
2023	16	AUG	12:47	13.89S	167.23E	188			6.5	VANUATU
2023	19	AUG	22:40	51.73N	3.83W	8	2.3			PONTERDAWE, NPT
Neath Port Talbot (NPT)										
2023	20	AUG	18:10	51.73N	3.83W	7	1.9			PONTERDAWE, NPT
Neath Port Talbot (NPT)										
2023	24	AUG	06:10	56.42N	5.98W	9	1.6			MULL, ARGYLL & BUTE
2023	28	AUG	17:42	42.58N	0.94E	10		4.6		PYRENEES
Felt France, Spain and Andorra (4 EMS).										
2023	28	AUG	19:55	6.79S	116.52E	500			7.1	BALI SEA, INDONESIA
2023	07	SEP	19:49	62.33N	4.81E	10	3.9			NORWEGIAN SEA
Felt in several places in western Norway (3 EMS).										
2023	08	SEP	09:09	32.80S	179.37W	79			6.6	KERMADEC ISLANDS
2023	08	SEP	22:10	31.06N	8.39W	19			6.8	MOROCCO
At least 2,940 people were killed, over 5,600 others were injured and major damage occurred throughout the Marrakesh-Safi region. The majority of casualties and damage occurred in many villages and settlements, close to the epicentre, in the High Atlas Mountain range.										
2023	09	SEP	13:28	52.11N	2.73W	14	2.4			HEREFORD, HEREFORDSHIRE
2023	11	SEP	05:21	55.59N	5.91W	8	2.5			GIGHA, ARGYLL & BUTE
Felt on Gigha, on Islay and in Muasdale on the Kintyre peninsula (3 EMS).										
2023	14	SEP	08:07	53.44N	3.22W	16	2.2			IRISH SEA
2023	22	SEP	19:55	56.13N	5.26W	16	1.7			CRARAE, ARGYLL & BUTE
2023	26	SEP	02:57	57.62N	5.72W	2	1.8			DIABAIG, HIGHLAND
2023	06	OCT	23:06	57.90N	5.29W	3	1.5			BADRALLACH, HIGHLAND
2023	07	OCT	06:41	34.61N	61.92E	14			6.3	AFGHANISTAN
At least 1,480 people killed, over 2,100 others injured and more than 38,500 buildings destroyed or heavily damaged as a result of this earthquake and the sequence of earthquakes that occurred in Afghanistan in October 2023. The majority of the damage and casualties occurred in Herat province.										
2023	07	OCT	07:12	34.57N	61.90E	10			6.3	AFGHANISTAN
Details of damage and casualties are included with the magnitude 6.3 Mw Afghanistan earthquake on 7 October at 06:41 UTC.										

Year	Day	Mon	Time UTC	Lat	Lon	Dep km	Magnitude ML	Mb	Mw	Location
2023	07	OCT	08:34	5.60S	146.13E	53			6.7	PAPUA NEW GUINEA
2023	07	OCT	08:40	5.51S	146.20E	76			6.9	PAPUA NEW GUINEA
2023	07	OCT	19:22	56.13N	6.14W	10	2.1			COLONSAY, ARGYLL & BUTE
Felt by several residents on Colonsay (3 EMS).										
2023	11	OCT	00:41	34.56N	62.05E	10			6.3	AFGHANISTAN
Details of damage and casualties are included with the magnitude 6.3 Mw Afghanistan earthquake on 7 October at 06:41 UTC.										
2023	15	OCT	03:36	34.61N	62.11E	10			6.3	AFGHANISTAN
Details of damage and casualties are included with the magnitude 6.3 Mw Afghanistan earthquake on 7 October at 06:41 UTC.										
2023	18	OCT	07:13	48.98N	2.79W	8	2.1			ENGLISH CHANNEL
2023	29	OCT	23:17	53.31N	4.52W	12	1.4			LLANFIGAEL, ANGLESEY
Felt Holyhead, Treaddur Bay, Bodorgan and Bryngwran, Anglesey (3 EMS).										
2023	31	OCT	11:10	17.52S	179.01W	549			6.5	FIJI ISLANDS REGION
2023	31	OCT	12:33	28.75S	71.57W	35			6.6	CHILE
2023	02	NOV	07:27	51.37N	2.40W	3	1.5			BATH, SOMERSET
2023	03	NOV	18:02	28.85N	82.19E	16			5.7	NEPAL
At least 157 people killed, over 600 others injured and many homes and buildings destroyed or damaged in Jajarkot and Western Rukum districts, Kernali province.										
2023	08	NOV	04:52	6.38S	129.78E	10			6.7	BANDA SEA
2023	08	NOV	04:53	6.46S	129.51E	10			7.1	BANDA SEA
2023	08	NOV	13:02	6.15S	129.91E	10			6.7	BANDA SEA
2023	17	NOV	08:14	5.59N	125.05E	78			6.7	MINDANAO, PHILIPPINES
2023	18	NOV	03:21	60.31N	1.61E	14	2.6			NORTHERN NORTH SEA
2023	18	NOV	23:14	57.63N	5.65W	3	1.9			DIABAIG, HIGHLAND
2023	19	NOV	00:50	49.97N	5.36W	13	2.7			MOUNT'S BAY, CORNWALL
Felt Helston, Penzance, Camborne and many other towns and villages in Cornwall, mainly from within approximately 30 km of the epicentre (4 EMS).										
2023	22	NOV	04:47	14.99S	167.98E	22			6.7	VANUATU
2023	24	NOV	09:05	20.16N	145.55E	16			6.7	NORTHERN MARIANA ISLANDS
2023	27	NOV	21:46	3.57S	144.04E	10			6.6	PAPUA NEW GUINEA
2023	29	NOV	11:02	61.73N	3.99E	13	3.9			NORWEGIAN SEA
Felt in several places in western Norway (3 EMS).										
2023	29	NOV	23:51	50.12N	6.41W	29	2.3			CELTIC SEA
Felt Isles of Scilly (2 EMS).										
2023	30	NOV	17:20	51.96N	1.67E	8	2.2			SOUTHERN NORTH SEA
2023	02	DEC	14:37	8.53N	126.45E	32			7.6	MINDANAO, PHILIPPINES
At least 2 people killed and 9 others injured on Mindanao Island.										
2023	03	DEC	10:35	8.45N	126.72E	56			6.6	MINDANAO, PHILIPPINES
2023	03	DEC	19:49	8.95N	126.61E	29			6.9	MINDANAO, PHILIPPINES

Year	Day	Mon	Time UTC	Lat	Lon	Dep km	Magnitude ML	Mb	Mw	Location
2023	07	DEC	12:56	20.66S	169.21E	48			7.1	VANUATU
2023	09	DEC	15:18	56.62N	5.59W	7	2.1			MORVERN, HIGHLAND
Felt Isle of Lismore and Benderloch, Argyll & Bute (3 EMS).										
2023	11	DEC	11:27	55.84N	6.29W	8	1.6			ISLAY, ARGYLL & BUTE
2023	13	DEC	02:07	53.63N	3.36W	10	2.7			IRISH SEA
2023	15	DEC	22:03	56.56N	5.74W	5	1.5			MORVERN, HIGHLAND
2023	18	DEC	15:59	35.74N	102.83E	10			5.9	GANSU, CHINA
At least 151 people killed, over 980 others injured and thousands of homes damaged or destroyed in Gansu and Qinghai provinces, China.										
2023	20	DEC	03:43	52.83N	4.72W	19	1.8			CAPEL CARMEL, GWYNEDD
Felt Rhydlios, Aberdaron and Abersoch, Gwynedd (3 EMS).										
2023	24	DEC	05:16	56.30N	5.47W	5	2.0			KILMELFORD, ARGYLL & BUTE
Felt Isle of Mull, Isle of Lismore, Clachan-Seil and Lochgilphead (3 EMS).										
2023	28	DEC	09:15	44.58N	148.99E	23			6.5	KURIL ISLANDS

Forthcoming Events

Evening Lecture

Development of a new ground-motion model for the UK using the hybrid empirical-stohastic method

John Douglas
Hybrid event
28 February 2024 (6:00 - 8:00 pm)

Synopsis

In this evening meeting, the results of a project funded by the Royal Academy of Engineering and in collaboration with Jacobs will be presented. In this project, we developed a new UK ground-motion model using a state-of-the-art method (hybrid empirical-stochastic method) and UK data. Capturing of the considerable epistemic uncertainties in ground-motion prediction for the UK, where data are sparse, was a particular focus of our project. Additionally, we sought to facilitate the use of the model in future seismic hazard assessments by providing simplified backbone representations of the model. We will present a summary of the project and the impact of the new model on assessed seismic hazard for some typical UK sites.

Dr John Douglas

Dr John Douglas is a Senior Lecturer at the University of Strathclyde (Glasgow, UK) working in the fields of seismic hazard and risk evaluation. He has been consultant to various seismic hazard assessments for critical frastructure (e.g. Hinkley Point C). Previously (2004-2015) Dr Douglas was a senior engineering seismologist at BRGM (French Geological Survey). From 2009 to 2014 he was a visiting professor at the Earthquake Engineering Research Centre, University of Iceland. He obtained his Ph.D in Civil and Environmental Engineering (Engineering Seismology) in 2001, following a B.Sc. Hons (First Class) degree in Mathematics (both from Imperial College London, UK). In 2010, he was awarded his accreditation to supervise research (Habilitation à diriger des recherches) in seismology by the University of Grenoble (France).

Registration

The event will be chaired by Guillermo Aldama-Bustos (Jacobs). Attendance at this meeting is free for members and non-members alike. The event will held in-person at the Institution of Civil Engineers. Prior registration is not required. Seats are allocated on a first come, first served basis. Tea, coffee and biscuits will be served from 5.30 - 6 pm. will be broadcast online. We encourage everyone to attend in person if they can. This event will also be broadcast online. Please register for the event prior to joining via this link here. The registration process will provide you with the link you need to join the main event.

Evening Lecture

In search of the earthquake-proof building: an overview of research and ongoing developments towards multi-hazard resilient buildings

Simona Bianchi, Jonathan Ciurlanti
Online event
27 March 2024

Synopsis

This presentation aims to provide evidence on the potential of implementing an integrated, low-damage, resilient and sustainable structural and non-structural system. The talk will initially give an overview of damage-control technologies for both structural and non-structural components, including results from recent experimental and numerical simulations. The overarching goal is to underscore the imperative of enhancing safety levels for buildings through the development of integrated, multi-functional solutions.

Dr Jonathan Ciurlanti

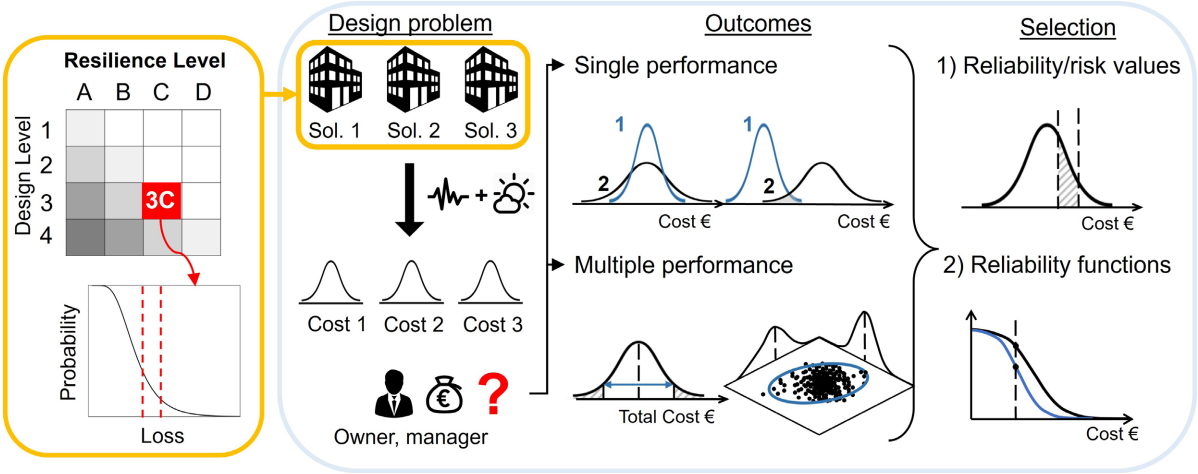
Dr Jonathan Ciurlanti is a Data Engineer and the Data & Analytics representative at Arup Netherlands. With a diverse background in Civil Engineering and a PhD in Structural-Seismic Engineering Cum Laude, he possesses a unique combination of engineering knowledge and digital skills. At Arup, he is currently involved in many digital initiatives, from real-time monitoring to carbon data collection & analytics, in which he effectively helps in managing the end-to-end process. Due to his passion for research and education, Jonathan maintains an active collaboration with academia, engaging in research related to sustainable structural design, probabilistic-based computational methods, risk assessment and resilience again natural hazards & climate change.

Dr Simona Bianchi

Dr Simona Bianchi is a Postdoctoral Researcher and Lecturer within the Structural Design & Mechanics Group at the Faculty of Architecture, Delft University of Technology. Her research primarily concerns probabilistic risk assessment and resilience design, with a specific focus on earthquake-proof and environmentally sustainable building technologies. She has been awarded a prestigious EU-funded Marie Skłodowska-Curie fellowship to work on performance assessment and multi-criteria decision-making of building facades. Currently, she serves as the Technical Lead for the €7.5M Horizon Europe MULTICARE project, aiming to develop low-carbon resilient solutions and digital tools for assessing, designing and managing multi-hazard resilience.

Registration

Information on the time of the event, and the registration procedure will be issued in due time.



Multi-hazard resilient buildings analysis.