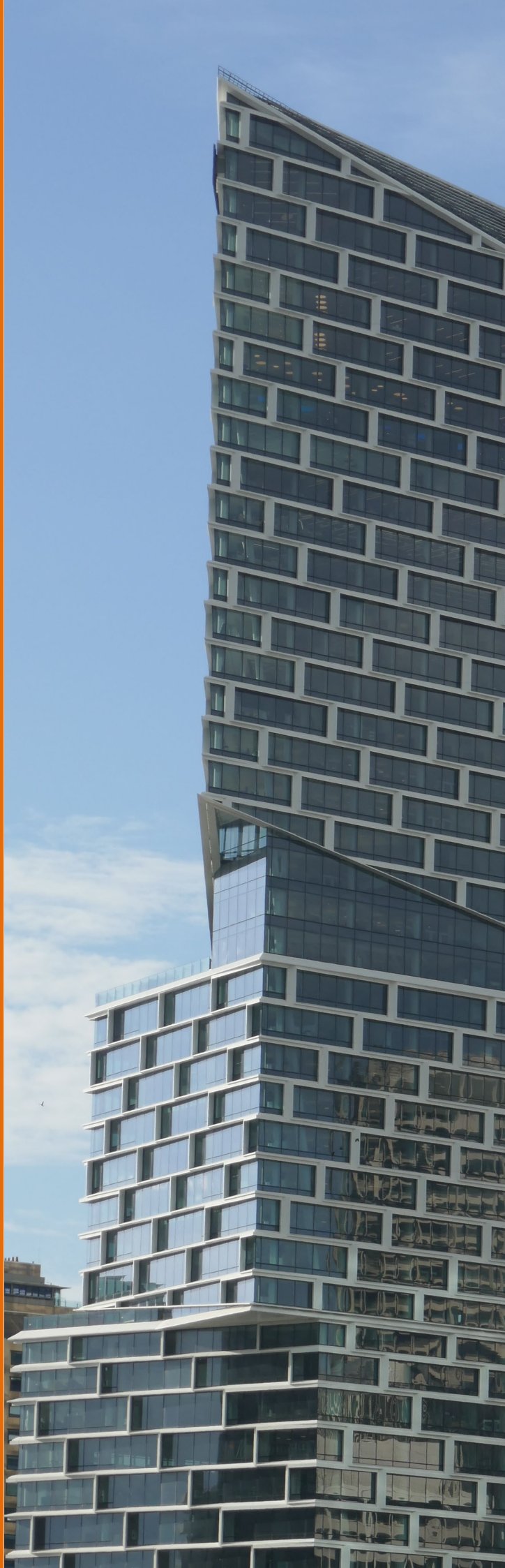
THE UNIVERSITY OF SYDNEY

Biennial report 2021-2022

Centre for Advanced Structural Engineering, School of Civil Engineering



Contents

Front cover: Quay Quarter Tower, Sydney

Centre for Advanced Structural Engineering (CASE)

The Centre for Advanced Structural Engineering within the School of Civil Engineering at The University of Sydney was established in August 1988 in order to:

- foster strong links between university and industry;
- increase the relevance of structural research;
- strengthen industry support for research;
- increase the services provided by the university to industry;
- widen structural research activities; and
- encourage gifted young Australians to do research.

The Centre for Advanced Structural Engineering (the Centre) is providing a successful model for operating the School's large Structures and Materials Laboratories through joint funding from the University, research grants and income generated through commercial activities with industry.

Reaffirming its commitment to helping young Australians to perform research in structural engineering, the Centre currently has 58 PhD research students and there were 22 PhD graduates in 2021-2022.

Reflecting the interactions between industry and the Centre, 5 investigation reports were produced by the Centre members in the 2021-2022 period. The substantial research activities of the Centre are demonstrated by the 23 ARC grants, 3 books, 2 book chapters, 171 journal papers and 12 conference papers listed in this report. The research covers many areas of structural engineering including composite structures, reinforced concrete structures, structural adaptive systems, thin-walled structures, members and frames, plate and shell structures, silos and bins, aluminium structures, stainless steel structures, built-up cold-formed steel structures, storage rack structures, tubular steel structures, concrete filled steel tubes, bolted and welded connections, fracture in concrete, monitoring of structures, solid mechanics, advanced structural materials, finite element analysis, computational fluid dynamics, probability and reliability analysis, seismic design, carbon fibre strengthening, concrete anchors, impact on structures, structural rehabilitation and wind on tall buildings.

While the Centre supports research within the School, it also relies on the University of Sydney and the School of Civil Engineering for administrative support. The Centre is grateful to the University and the School for the opportunities their support provides for the continued growth and development of the Centre.

Kim Rasmussen
Chairman

Gianluca Ranzi
Director

Objective

The Centre provides a unique focus for the research and development of structural engineering.

The Members of the Centre have international reputations for the excellence of their analytical and experimental research, and have played prominent roles in the development of Australian Standards for structural design.

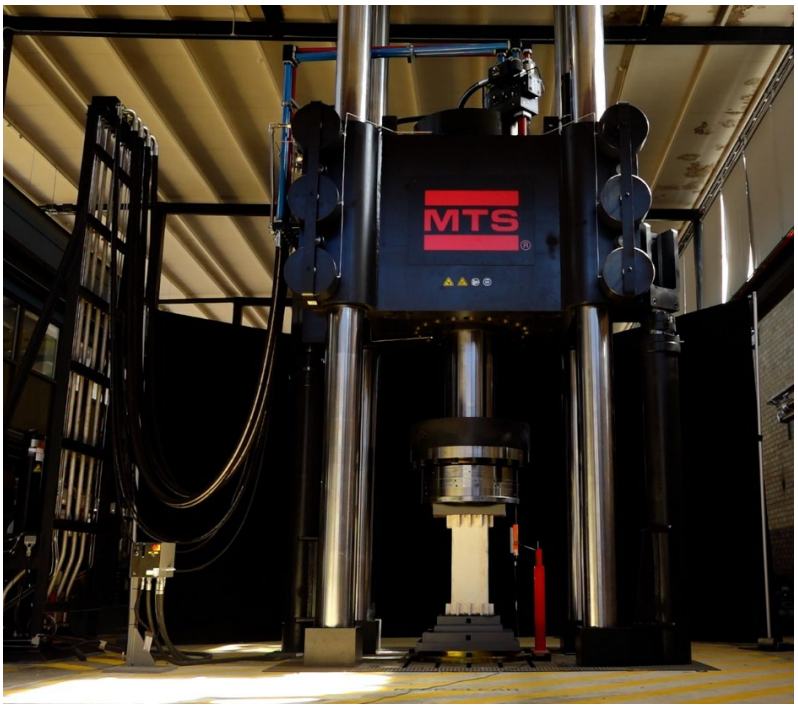
The objective of the Centre is to promote the advancement of structural engineering within Australia through:

- research and development of structural engineering;
- co-operation between the University and industry; and
- teaching of contemporary structural technology.

Services to Industry

The Centre provides a wide range of specialised services to the profession and industry. These include:

- studies of unusual structures, including proof engineering for structural adequacy, development of new structures, and investigations of failures;
- specialised design assistance, including design code interpretations and development of design procedures;
- supply or development of high quality computer software for analysis or design;
- specialised testing services for control testing, proof testing, product development, model testing and analysis confirmation; and
- training programs for the professional development of practicing engineers.



20 MN high capacity testing machine

Membership

The grades of membership of the Centre include Life Member, Life Technical Affiliate, Technical Affiliate, Special Donor, Member and Associate Member.

Life Members make a donation of not less than $10,000 or its equivalent, and Life Technical Affiliates of not less than $5,000. Technical Affiliates make an annual donation of $500.

Life members

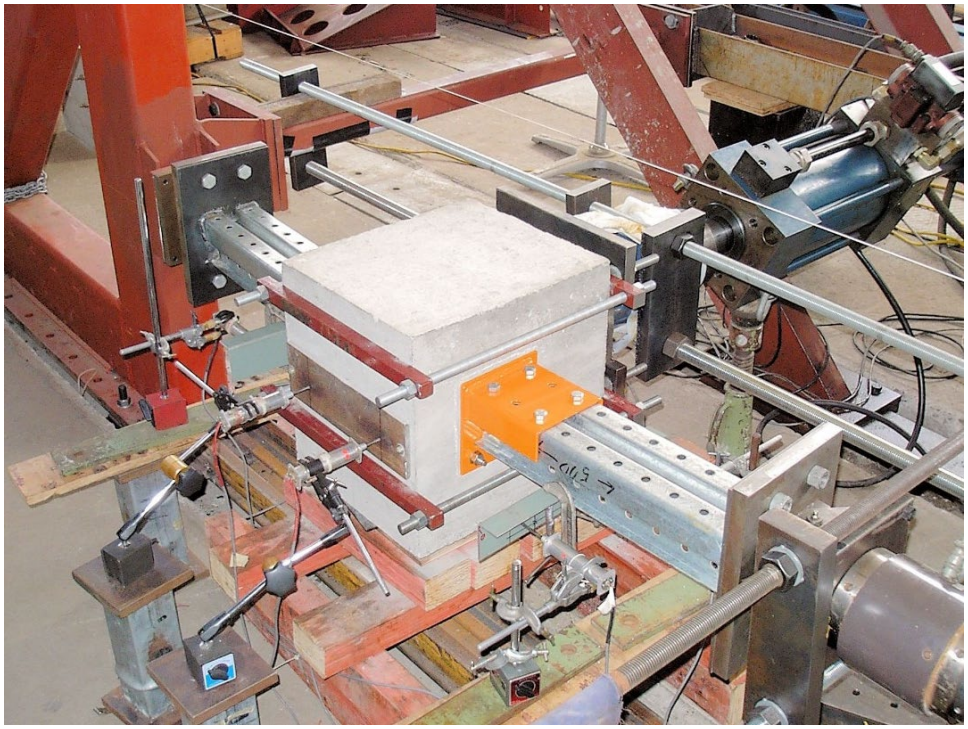
BlueScope Steel
BlueScope Lysaght
Civil and Civic Pty Ltd
IBM Australia Limited
OneSteel Market Mills
Arup and Partners
Roads and Maritime Services
SCP Consulting Pty Ltd
Strarch International Limited
Taylor Thomson and Whitting Pty Ltd

Special donor

Fozzard's Consulting Engineers

Technical affiliates

Australian Steel Institute
Sinclair Knight Mertz



Rack upright base-plate test

Executive committee members

Kim Rasmussen
Chairman of the Centre and Challis Professor in Civil Engineering, specialises in structural mechanics, analysis and behaviour, fracture, system reliability and design of thin-walled steel structures, aluminium and stainless steel structures.

Gianluca Ranzi
Director of the Centre and Professor in Civil Engineering, his research interests range from the field of structural engineering to architectural science, building energy management and power demand side management, and heritage conservation.

Ali Amin
Senior Lecturer in Civil Engineering, specialises in the structural analysis and design of high performance and fibre reinforced concrete structures.

Mike Bambach
Senior Lecturer in Civil Engineering, specialises in thin steel and composite structures, carbon fibre strengthening of steel structures, structures subjected to impact and blast loads, vehicle crashworthiness and road crash injury biomechanics.

Daniel Dias-da-Costa
Associate Professor in Civil Engineering, specialises in computational mechanics, structural analysis, monitoring, analysis and design of structures, concrete structures, fracture of brittle and quasi-brittle materials.

Ali Hadigheh
Senior Lecturer in Civil Engineering, specialises in structural maintenance and rehabilitation, durability and fracture mechanism of the interface in composite structures, structural health monitoring, sustainable construction materials, and disaster resilience of infrastructures.

Mani Khezri
Lecturer in Civil Engineering, specialises in innovative numerical methods, buckling and post-buckling behaviour of plates and of laminated plate assemblies, mathematical theory and numerical applications of Meshfree methods, fracture mechanics, and computational solid mechanics.

Fengji Luo
Academic Fellow in Civil Engineering, specialises in building energy management, energy-efficient buildings, building-to-grid integration, smart grids and power engineering.

Mohanad Mursi
Manager of the Centre, specialises in composite structures, reinforced concrete structures, and in the design and instrumentation of structural testing systems. He also provides consulting, proof engineering and expert witness services.

John Papangelis
Professional Officer in Civil Engineering, specialises in thin-walled structures, cold-formed purlin systems, beams with corrugated webs, finite element analysis and computer analysis of steel structures.

Cao Hung Pham
Associate Professor in Civil Engineering, specialises in thin-walled structures especially cold-formed members and systems, testing, finite element and computational modelling.

Gwénaëlle Proust
Professor in Civil Engineering and Academic Director of the Sydney Manufacturing Hub, specialises in the experimentation, characterisation and modelling of the mechanical properties of metals, and the relationships between mechanical properties of materials and their microstructure.

Luming Shen
Professor in Civil Engineering, specialises in mechanics of materials, multiscale modelling and simulation, solid-fluid interactions and impact engineering.

Brian Uy
Professor in Civil Engineering, specialises in composite structures, critical infrastructure protection, deconstruction, rehabilitation and strengthening, steel structures, structural health, structural systems and sustainable construction.

Tim Wilkinson
Professor in Civil Engineering and Associate Dean (Student Life), specialises in tubular structures, connections, welding, finite element analysis and engineering education.

Hao Zhang
Associate Professor in Civil Engineering, specialises in non-linear finite element modelling, structural reliability analysis, probabilistic risk assessment of engineering facilities and seismic design.

Research fellow

Gregory Hancock

Chairman of the Centre from 1991-2002, Emeritus Professor and Professorial Research Fellow in Civil Engineering, specialises in the computer analysis of structures, tubular structures, and the behaviour of thin-walled and cold-formed structures.

Honorary members

Peter Ansourian

Director of the Centre from 1991 to 2001 and Honorary Associate Professor in Civil Engineering, specialises in the computer analysis of structures, especially plate and shell structures, silos and bins, and composite structures.

Wije Ariyaratne

Honorary Professor in Civil Engineering, specialises in bridge engineering and formerly Director Bridges and Structures, Transport for NSW, Chairman of the committee for the Australian Bridge Design Standard and recipient of the NSW Premier's Award in the category Delivering Infrastructure (Individual).

Stuart Reid

Director of the Centre from 2003-2011 and Honorary Associate Professor in Civil Engineering, specialises in the behaviour and design of reinforced concrete structures, structural reliability and risk analysis, seismic design, and the safety and strength of architectural glazing.

Robert Wheen

Honorary Associate Professor in Civil Engineering, specialises in prestressed concrete structures, and in particular tension members and membranes. He has a special interest in the early conceptual phases of structural design. He has been involved in a wide range of laboratory and field instrumentation and testing of prestressed and reinforced concrete structures.

Vale Nick Trahair

Emeritus Professor Nicholas Trahair, founding Chairman of the Centre, passed away in 2021.

Nicholas Snowden Trahair, a leading Australian academic and contributor to knowledge of the behaviour and design of steel structures, died on May 19, 2021, at the age of 87, after a long battle with lung cancer.

Nick was born in Brisbane on 29th April 1934. His father Geoffrey was a neurologist, his mother Alice had a degree in commerce from the University of Melbourne. Nick went to Fort Street Boys high school in Sydney, where he excelled in sport (rugby union, water polo and swimming) and led the school chess team to victory in the Sydney All Schools competition.

Nick received five degrees from the University of Sydney, including a Bachelor of Science (1954), Bachelor of Engineering (1956) and Master of Engineering Science (1959). In 1960, after three years with the Department of Works in Canberra, he joined the Department of Civil Engineering at the University of Sydney, and went on to receive a Doctor of Philosophy in 1968 and a prestigious Doctor of Engineering in 1994. He was appointed Lecturer in Civil Engineering in 1960 and rose through the ranks to Professor in 1979, then Challis Professor of Civil Engineering (1984-1998), and Emeritus Professor from 1999 onwards. He held visiting appointments at Washington University, The University of Sheffield, The Japanese Society for the Promotion of Science, The University of Alberta and Imperial College of Science and Technology, and delivered invited lectures throughout the world.

As head of the structures group, he nurtured a cohort of PhD students and provided opportunities for younger colleagues, many of whom proceeded to have outstanding academic and professional careers. He created a supportive environment and an ambition to be a world-leading research group in steel structures. Amidst the focus on teaching and high quality research, he was known as a formidable spin bowler at the annual cricket matches between PhD students and staff.

Nick created the Centre for Advanced Structural Engineering at the University of Sydney to strengthen links with industry in 1989. Through the Centre, he worked on exciting projects such as the design and testing of components for the Olympic Stadiums for the Sydney 2000 Olympics. He also created the BHP Steel Chair (1990) in conjunction with the then CEO of the Australian Institute of Steel Construction. In its time, it was the first industry funded chair in Engineering at the University of Sydney, and set a significant precedent for the University.

Nick was Director of the Australian Institute of Steel Construction (1989-1998), Fellow of the Institution of Engineers Australia and Member of the American Society of Civil Engineers. From 1964 to 1995, he was a member of the Steel Structures Committee of Standards Australia which produced the steel design codes AS-CA1 (1968), AS1250 (1972, 1975, 1981), and the first cold-formed steel structures code AS1538 (1974). He co-chaired the Steel Structures Committee which developed the Limit States Steel Structures Standard AS4100 (1990), internationally regarded as one of the world's leading steel design standards. Nick is broadly considered the

father of AS4100 and many of the design equations developed by Nick and featured in AS4100 have been adopted across the world. Nick was also instrumental in moving Australian steel design into the "computer" age, as principal developer of the LIMSTEEL computer software design package which is almost universally used in Australia and New Zealand for the routine design of steel structures.

Throughout his 38-year career, Nick maintained a strong and continuing connection to academic research, teaching and industry collaboration. He was engaged by bridge consultant MBK (now Cardno) in 1981 to undertake complex buckling analyses of steel truss road bridges to be fabricated in Australia and supplied to Indonesia. Nick's work was essential in ensuring the stability and safety of the bridges, which were of spans to 80m and erected by cantilever method. In a massive program, over 3,500 spans were subsequently fabricated and supplied for bridges built throughout Indonesia in the 1980/90s incorporating Nick's recommendations. He was also engaged to advise on the structural performance of the Sydney Cricket Ground lighting towers when the National Rugby League Grand Final 1981 was almost cancelled due to dynamic vibration under high wind. He formed a team with younger academics to write computer programs for vibration analyses, undertake structural testing on key components and instrument the towers for vibration measurements, ultimately to propose effective measures to dampen vibrations.

In 1995, an international conference was held in Sydney to honour his 60th birthday and achievements in structural stability and in the design of steel structures, with representatives from most major economies attending. Amongst these were the chairmen of the British, German, Canadian and New Zealand steel structures committees, and members of national steel structures committees from the USA, Italy, Singapore, Japan and South Africa. The Proceedings contain an outstanding set of papers in testimony to Nick's international reputation as a world leader in structural stability and design.

Nick continued his research after retiring in 1999 and was called upon as advisor for several major projects, including the design of the arch for the Wembley Stadium in 2000, a world first in terms of its structural form and scale. The arch comprised some 500 individual steel tubes laced together to form a 450m long fully welded elegant lattice structure. It was designed from first principles of structural engineering by a design team at Connell Wagner. To build confidence within the project team, Nick was asked to conduct an independent review of the design methodology and confirm that it provided adequate structural reliability. Nick's verification of the proposed approach gave the team the sought confidence in their design. Likewise, when the western grandstand of the WIN Stadium in Wollongong buckled in strong winds in 2011, the local government appointed Nick as its independent expert to oversee and instil confidence in the redesign.

Nick's contributions to research, design and teaching of steel structures are enormous. He was the author of two seminal books - The Behaviour and Design of Steel Structures (now in six editions providing advice on the steel design codes of Australia, USA, UK, and Europe) and Flexural-Torsional Buckling of Structures, and over 220 research papers. It is Nick's research into the lateral buckling of steel structures that gained him international standing in structural stability, with his contributions in this area being considered by many as unrivalled. This work earned Nick numerous national and international awards, including six medals and prizes from the Institution of Engineers, the ASCE Shortridge Hardesty Award for "his research on the lateral-torsional stability of beams and active participation in the development of several standards that are of significant value to the profession", and the Lynn Beedle Award of the Structural Stability Research Council.

Nick married Sally (nee Dixon) in 1959. They had five children: Jeremy, Lisa, Andrew, Jonathan and Benjamin, of whom Jonathan died from heart disease in 2020. Nick was a devoted husband and loving father. After retiring in 1999, he travelled extensively and played golf and bridge. He was an avid gardener and loved literature, from the ancient Greek classics to science fiction and the contemporary novel. He continued to write papers on structural engineering and was corresponding with colleagues about work until a week before he died. Nick is survived by his beloved Sally, his other four children, and six grandchildren (Joanna, Katie, Esme, Linus, Julian and Angus).

Nick was not only an outstandingly eminent structural engineer with tremendous impact in the domain of steel structures but also a humble and gracious man. He was known for his clear thinking and concise writing, which he patiently imparted to students and younger colleagues.

Kim Rasmussen
Gregory Hancock
Mark Bradford (UNSW)

Contact details

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Research grants

The Centre has been successful in obtaining a high number of research grants in the period 2021-2022.

ARC Discovery Grants

Gilbert R, Amin A
Time dependent behaviour of fibre reinforced concrete structures, DP200102114.

Hancock G, Pham C, Rogers C
New systems for high rise steel structures in rising factory construction, DP210102356.

Hill D, Luo F, Kanhere S, Qiu J
Customer centred peer-to-peer energy trading framework for future grids, DP220103881.

Ranzi G, Santamouris M, Fiorito F, Synnefa A, Kohl M
Elastocaloric cooling systems for buildings and the built environment, DP180101589.

Ranzi G, Santamouris M, Pignatta G, Pattabhi Raman A, Shah K, Rossi F
Scalable daytime radiative cooling for buildings and the built environment, DP200100773.

Rasmussen K, Tong L, Bambach M
Achieving structural morphing via functionalizing nonlinear buckling, DP170104916.

Rasmussen K, Schafer B
Analysis and design of midrise built-up cold-formed steel structures, DP220103573.

Rasmussen K, Zhang H, Khezri M, Deierlein G
Complete limit state analysis of steel structural framework, DP190103737.

Rasmussen K, Zhang H, Paradowska A, Muransky O, Gardner L
Reliability and design of 3D printed metal structures, DP210103103.

Rognon P, Marks B, Proust G
Preventing extreme granular wear of geotechnical machinery, DP200101927.

Santamouris M, Ranzi G, Paolini R, Valenta J, Papakonstantinou I
Fluorescent daytime radiative cooling for urban heat mitigation, DP220100318.

Shen L
Modelling fluid-solid interaction in micro- and nano-porous media, DP190102954.

Shen L, Chen Z, Maggi F, Pan Z
Multiscale modelling of multiphase interactions in shale gas reservoirs, DP200101919.

Uy B
Behaviour and design of large fabricated stainless steel composite structures, DP180100418.

Uy B, Thai H
Innovative coupled composite steel-concrete shear wall and frame systems, DP200100112.

ARC Linkage Grants

Ranzi G, Gilbert R, Inglis C, Murray M, Mackay-Sim R
Development of prefabricated composite building components and connections, LP200301672.

Rode A, Madden S, Proust G, Wain L, Paradowska A, Drew M, Mohan M
Laser cleaning process for roads and maritime services bridges, LP180100276.

Tao Z, Uy B, Pan Z, Rahme M, Rahme D
Development of next generation fire-resistant composite columns, LP160101484.

ARC Linkage Infrastructure, Equipment and Facilities Grants

Paradowska A, Ringer S, Rasmussen K, Proust G, Lewis W, Birbilis N, Li R, Li H, Mashiri F, Reid M, Kimpton J
Australian Stress Engineering Facility, LE210100057.

Paradowska A, Ringer S, Ye L, Rasmussen K, Zhang H, Preuss M, Abrahams R, Birbilis N, Li R, Mashiri F, Wensrich C, Gulizia S, Bendeich P
Metallurgical facility for solid-state additive manufacturing, LE220100182.

ARC Discovery Early Career Researcher Awards

Hadigheh A
Aligned recycled carbon fibre composites for high grade structural elements, DE200100406.

ARC Industrial Transformation Training Centres Grants

Mendis P, Ngo T, Rasmussen K, Ranzi G, Aitchison M, Newman P, Hao H, Zhao X-L, Manzie C, Qiao G, Aye L, Duffield C, Singh P, Bai Y, Crawford R, Noguchi M, Fiorito F, Alfano J, Colquhoun R, Liaskos J, Crough D, Pidcock D, Miletic M, Perren N, Kirk R, Zendler J
ARC Training Centre for Advanced Manufacturing of Prefabricated Housing, IC150100023.

ARC Industrial Transformation Research Hubs Grants

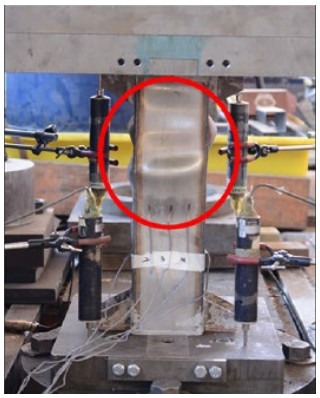
Pham C + 34 others
ARC Research Hub for Australian Steel Innovation, IH200100005.

University of Sydney Research Grants

Abbas A, Ghadi A, Montoya A, Valix M, Hadigheh A, Dias-da-Costa D
Upcycling of power plant fly-ash into low-carbon eco-pavements, Industry and Community Engagement Seed Fund in partnership with Delta.

Cairney J, Yen H, Proust G, Lee Y, Chung R
New biomedical alloys that reduce inflammation via gradual hydrogen release, Office of Global Engagement/Partnership Collaboration Awards.

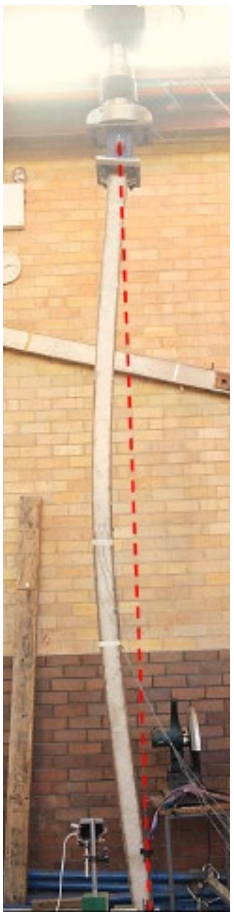
Dias-da-Costa D
Smart sensors for intelligent buildings, Nano Institute/Kickstarter.



Local buckling

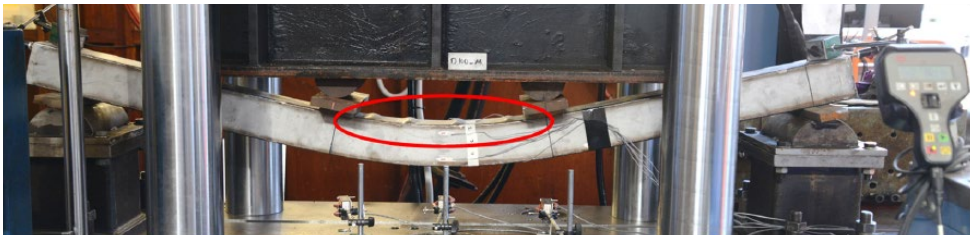
Local buckling and weld fracture

Local and global buckling



Global buckling

Local buckling of top flange and parts of web



Local buckling of top flange

Testing of box concrete-filled stainless steel tubes

Dias-da-Costa D
Technology for predicting, monitoring and assessment of structural damage, University of Sydney SOAR prize.

Hadigheh A
Advanced design and fabrication of recovered carbon fibre for enhanced mechanical and multifunctional performance, Faculty of Engineering Early Career Researcher Development Scheme.

Hadigheh A
An innovative method for precise alignment of recycled carbon fibre, Commercial Development and Industry Partnerships (CDIP) Fund.

Hadigheh A
Engineered living materials for a sustainable future, Nano Institute/Kickstarter.

Hadigheh A
Upcycling of composite waste and industrial by-products for development of sustainable low resistance cementitious matrix for cathodic corrosion protection in bridges, DVC Research/External Research Collaboration Seed Funding.

Shen L, Chauhan K
Controlling fluid flow at solid surfaces, Civil Engineering Research Development Scheme.

University of Sydney Teaching and Learning Grants

Goldfinch T, Willey K, Matous P, Sakhaee E, Fiford R, Hadigheh A, Miao G
Supporting and assessing cultural competence in engineering, DVC Education/Large Educational Innovation Grant.

Hadigheh A, Thomas J, Goldfinch T, Opdyke A, Nezhad A
Towards a research-informed design for immersive virtual reality (IVR) environments, FEIT EIU Strategic Education Grant/Large Education Innovation Grant.

Uy B, Hadigheh A, Amin A
Structural health monitoring of bridges using an adaptive on-site smart laboratory, FEIT EIU Strategic Education Grant/Large Education Innovation Grant.

Other Research Grants

Arrayago I, Rasmussen K, Real E
New generation design methods for stainless steel structures, European Commission Research Executive Agency, Marie Skłodowska-Curie Individual Fellowship.

Geng Y, Ranzi G, Zhao M-Z, Wang Y-T, Zhu C-G, Yin H-T, Hu J-X, Wei M
Creep mechanism for confined concrete and its influence on static and seismic responses of steel tube confined concrete columns with circular cross-section, National Natural Science Foundation of China, 51778184.

Hadigheh A
Immersive technology and 3D mapping for bridge condition assessment and rehabilitation, Transport for NSW/NSW Government.

Hadigheh A
New generation of advanced fibre optics for intelligent structural health monitoring of bridges, NSW Smart Sensing Network/NSSN Grand Challenge Grant.

Hadigheh A
Recycling of carbon reinforced polymer (FRP) composites, The CASS Foundation Travel Award.

Hadigheh A
Sustainable acid resistant mortars modelling, development and performance assessment, Transport for NSW/Commissioned Research.

Mursi M
Anchorage and blocks AS1314 gripping efficiency, Innovation Connections Project.

Proust G, Wang H
DEM and crystal plasticity FEM modelling of surface mechanical attrition treatment, Office of Global Engagement/Partnership Collaboration Awards.

Ramezani M, Levinson D, Moylan E, Bambach M
Strategic scheduling and deployment of random breath and drug testing operations, Department of Infrastructure, Transport, Regional Development and Communications/Road Safety Innovation.

Ye H, Shen L
The controllable transport behaviour of multiphase flow inside nanopores under the coupled electro-thermo-mechanical effect, National Natural Science Foundation of China, 11672063.

Committees

The members of the Centre are active on many committees to further research and develop standards for structures.

Ansourian P
Standards Australia:
- BD/65 - Loads on Bulk Solid Containers

Ariyaratne W
Standards Australia:
- BD/90 - Bridge Design (Part 7: Bridge Assessment)

Dias-da-Costa
International Federation for Structural Concrete
- Task Group 2.4.2 - Modelling of Fibre Reinforced Concrete Structures

Hadigheh A
Standards Australia:
- MT/007 – Non-Destructive Testing of Metals and Materials

Hancock G
Standards Australia:
- BD/1 - Steel Structures (Independent Chair)
- BD/23 - Structural Steel (Chair)
- BD/67 - Steel Storage Racks
- BD/73 - Towers
- BD/82 - Cold-Formed Steel Structures (Chair)
- MT/001 - Metals (Independent Chair)

American Iron and Steel Institute:
- Specification Committee for the Design of Cold-Formed Steel Structural Members
- Subcommittee 3 - Connections
- Subcommittee 24 - Flexural Members

Mursi M
Standards Australia:
- BD/90 - Bridge Design

Ranzi G
Standards Australia:
- BD/2 - Concrete Structures
- BD/32 - Composite Construction
- BD/66 - Tiltup Construction
- BD/90 - Bridge Design (Part 5: Concrete)

American Concrete Institute:
- ACI 209 - Creep and Shrinkage in Concrete

Rasmussen K
Standards Australia:
- BD/1 - Steel Structures
- BD/43 - Formwork
- BD/50 - Aluminium Structures (Chairman)
- BD/62 - Steel Storage Racks (Chairman)
- BD/86 - Stainless Steel Structures

American Society of Civil Engineers:
- ASCE-8 - Cold-Formed Stainless Steel Structural Members

American Iron and Steel Institute:
- Specification Committee for the Design of Cold-Formed Steel Structural Members
- Subcommittee 22 - Stability and Combined Actions
- Subcommittee 35 - System Reliability

Structural Stability Research Council:
- Task Group 3 - Stability of Steel Systems, Especially Frames

Reid S
Standards Australia:
- BD/7 - Glazing and Fixing of Glass
- CE/26 - Precast Reinforced Concrete Box Culverts

Shen L
Standards Australia:
- MT/006 - Mechanical Testing of Metals

Wilkinson T
Standards Australia:
- WD-006 - Welding of Structures

CIDECT:
- Technical Working Group

Uy B
Standards Australia:
- BD/1 - Steel Structures
- BD/2 - Concrete Structures
- BD/32 - Composite Construction (Chairman)
- BD/90 - Bridge Design
- ME/43 - Bulk Handling Equipment

American Institute of Steel Construction:
- Task Committee 5 - Composite Construction

American Society of Civil Engineers:
- Technical Committee on Composite Construction

Editorial boards

The members of the Centre sit on the editorial boards of many international journals for the analysis and design of structures.

Bambach M
Accident Analysis and Prevention (Associate Editor)
Thin-Walled Structures

Hancock G
International Journal of Applied Science and Engineering
Journal of Advances in Structural Engineering
Journal of Constructional Steel Research

Pham C
Buildings
Journal of Science and Technology in Civil Engineering
Thin-Walled Structures

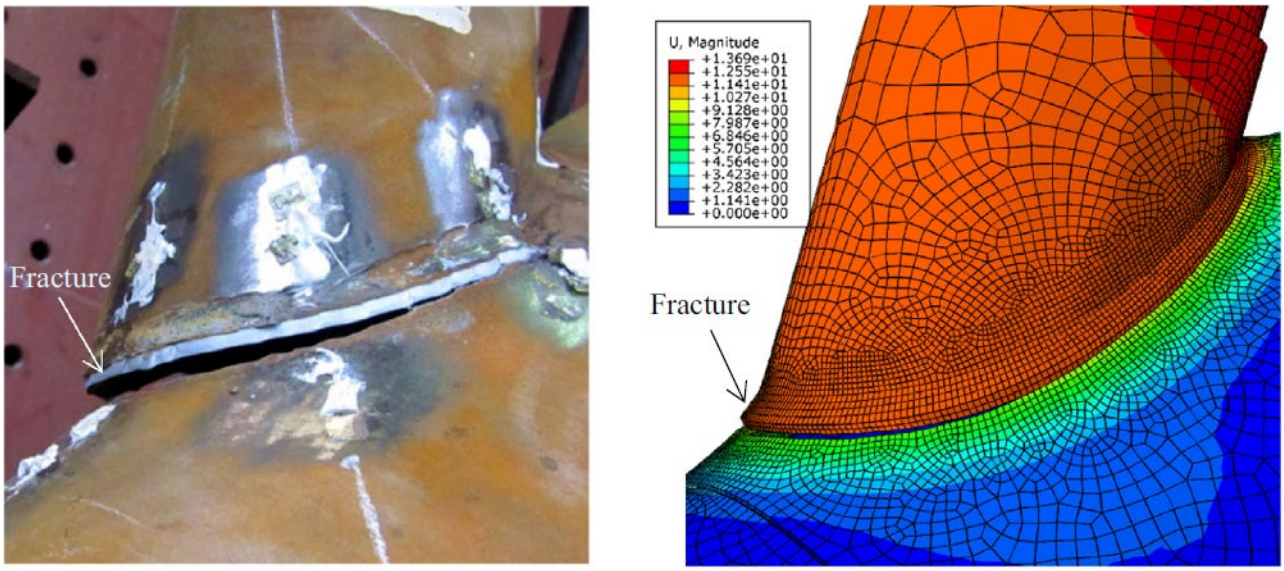
Ranzi G
International ACF Journal
International Journal of Steel Structures
Steel and Composite Structures

Rasmussen K
International Journal for Advanced Steel Construction
Journal of Constructional Steel Research
Steel and Composite Structures
Steel Construction
Thin-Walled Structures

Shen L
Materials and Design

Uy B
Australian Journal of Structural Engineering
International Journal of High-Rise Buildings
Journal of Advances in Steel Construction
Journal of Civil Engineering and Architecture
Journal of Constructional Steel Research
Steel and Composite Structures (Editor in Chief, Asia-Pacific)
Structures
Structures and Buildings

Zhang H
International Journal of Reliability and Safety



Observed and simulated failure mode in concrete-filled steel tubular Y-joint

PhD graduates

Our hard-working PhD students play a huge role in the research output of the Centre.

Abbasi M (Supervisor: K Rasmussen)
Sectional buckling of built-up cold-formed steel columns.

Alam J (Supervisor: D Dias-da-Costa)
Remaining service life assessment of deteriorated concrete bridges under mixed uncertainty.

Bybordiani M (Supervisor: D Dias-da-Costa)
Efficient simulation of quasi-static and dynamic crack propagation using enhanced finite elements.

Chen B (Supervisor: L Shen)
Gaussian process regression-based data-driven material models for stochastic structural analysis.

Chen Z (Supervisor: L Shen)
A smoothed particle hydrodynamics approach for modelling meso-scale fluid–fracture Interaction.

Hu Y (Supervisor: K Rasmussen)
Analytical solutions and applications for buckling-induced structural morphing of plates and frames.

Huang Y (Supervisor: G Proust)
Exploring anisotropy and residual stress in fused filament fabrication for 4D printing.

Jin D (Supervisor: L Shen)
Performance analysis and design of demountable concrete-filled steel tubular K-joints by advanced numerical modelling.

Kazemzadeh Azad S (Supervisor: B Uy)
Behaviour and design of fabricated concrete-filled stainless steel tubular columns.

Li G (Supervisor: L Shen)
Performance and countermeasures of concrete-filled steel tubular columns in corrosive environments.

Nguyen C (Supervisor: C Pham)
Strength and behaviour of cold-rolled aluminium portal frames.

Peng J (Supervisor: L Shen)
Performance and design of composite modular system with tenon connections for multi-storey buildings.

Song Y (Supervisor: B Uy)
Behaviour and design of stainless steel and stainless steel-concrete composite beam-to-column joints with end-plate connections.

Truong N (Supervisor: C Pham)
Structural behaviour of power-actuated fasteners in hybrid steel connections.

Wang R (Supervisor: G Proust)
Microstructure and dynamic behaviour of polymeric foams with application to multilayered protective structures.

Watts M (Supervisor: A Amin)
Time dependent behaviour of fibre reinforced concrete.

Weerasinghe D (Supervisor: M Bambach)
Design of a soft armour consisting of coated aramid fabrics.

Wijesooriya K (Supervisor: A Amin)
An uncoupled fluid-structure interaction numerical framework to estimate wind induced loads on super-tall structures.

Yang L (Supervisor: L Shen)
Fracture behaviour of layered rocks with alternating stiff and soft layers.

Zaghloul A (Supervisor: B Uy)
Analysis of structures under the effects of multiple simultaneously detonated charges.

Zhang H (Supervisor: M Bambach)
Material distribution in metal plates for buckling control in kinetic facades.

Zhou Y (Supervisor: B Uy)
Behaviour and design of fabricated stainless steel and stainless steel-concrete composite beams.

ICTWS2023

The 9th International Conference on Thin-Walled Structures will be held at the University of Sydney in 2023.

Introduction

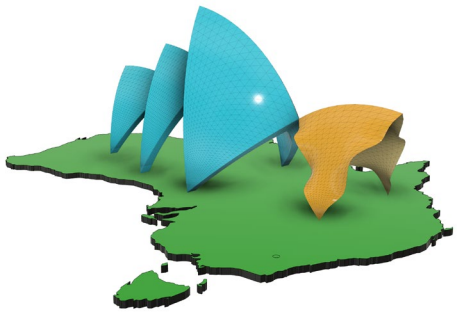
Thin-walled structures constitute a broad field covering civil, mechanical and aeronautical branches of engineering, numerous materials (e.g., steel, aluminium, fibre-reinforced plastics, functionally graded materials, nanomaterials), and diverse industries and applications (e.g., construction, automotive, aircraft, marine, space). The emergence of novel structural materials and connection technologies, together with the ongoing progress in computational tools and design specifications, demands the continuous advancement of innovative thin-walled structures in a wide range of areas.

The Thin-Walled Structures international conference series was initiated in 1996 in Glasgow under the auspices of the Journal of the same name and its Founding Editor, Prof. Jim Rhodes. Thin-Walled Structures has remained active in fostering the continuation of the conference series in the last nearly three decades. Since the initial conference in Glasgow, conferences have been held in Singapore (1998), Krakow (2001), Loughborough (2004), Brisbane (2008), Timisoara (2011), Busan (2014) and Lisbon (2018). ICTWS2023, to be held in Sydney from 29 November to 1 December 2023, will be the ninth in this prestigious series of conferences.

Conference Topics

ICTWS2023 aims to provide a forum where researchers and designers join to present, discuss and disseminate the most recent theoretical, numerical and experimental advances in all areas related to thin-walled structures, including but not limited to:

- Steel, stainless steel and aluminium structures
- Fibre-composite and other material structures
- Members and connections
- Plates and shells
- Advanced analysis methods
- Optimisation methods and applications
- Impact and progressive collapse



- Additive manufacturing (3D printing)
- Deployable and inflatable structures
- Machine learning in engineering design

One of the main goals of ICTWS2023 is to promote an exchange of ideas that inspires innovative research paths and fosters new collaborative endeavours. We expect ICTWS2023 to have an impact on the future research and development activity in all topics included in the program. You are warmly invited to actively participate in the Conference.

Conference Venue and Date

ICTWS2023 is an in-person conference, to be held at the University of Sydney from 29 November to 1 December 2023. The University Campus is known for its beautiful, lush surroundings, outstanding architecture and close proximity to Sydney CBD. The weather will be warm and pleasant, and likely to be dry and sunny.

Important Deadlines

- Submission of abstracts - 7 May 2023
- Acceptance of abstracts - 15 May 2023
- Submission of full papers - 15 July 2023
- Acceptance of full papers - 15 September 2023

Organising Committee

M Bambach
M Bradford
B Gilbert
M Khezri
M Mahendran
Q Li
J Papangelis
C Pham
K Rasmussen
Z Tao
L Tong
B Uy
T Wilkinson
H Zhang

Master of Engineering (ME) degree

The following Units of Study are offered in the Master of Engineering (ME) degree in the School of Civil Engineering:

CIVL5266 – Steel Structures-Stability

C Pham

This unit aims to: provide fundamental understanding at advanced level of the behaviour and design of hot-rolled/fabricated and cold-formed steel members; to provide fundamental understanding of newly developed Direct Design Method (DDM) for analysis and design of structural systems; and to develop an understanding of the behaviour and design of steel connections in open and hollow sections. It is anticipated that at the end of this unit of study students should be familiar with the behaviour of steel structures at advanced level in selected areas, including design for local buckling and design for flexural-torsional buckling of columns and beams; have a sound knowledge of AS 4100 in the areas of section capacity determination of slender cross-sections, and flexural-torsional buckling of beams; have a sound knowledge of AS/NZS 4600 in the areas of section capacity determination of slender cross-sections, and flexural-torsional buckling of columns and beams; have knowledge of the use of FEM software in the design of structural systems; have the skills to assess the behaviour of specific connections; have an appreciation of some practical aspects of economical steel connection design. This unit will examine stability theory, Stability design to AS4100 and AS/NZS4600, Direct Design Method, Steel connection design.

CIVL5269 – Advanced Concrete Structures

A Amin

This Unit reviews the fundamental concepts of 'elastic' behaviour of reinforced concrete structures and introduces models of behaviour and methods of analysis related to the time-dependent effects of creep and shrinkage (at service loads). This Unit also examines the non-linear (strain-softening) behaviour of reinforced concrete and the related effects concerning the strength of statically-indeterminate reinforced concrete structures. In particular, this Unit examines the concepts of ductility, moment-redistribution and plastic design (for beams and slabs). Strut-and-tie modelling of reinforced concrete members is also described. Design guidelines will reflect requirements of the Australian Standards and Eurocodes. This Unit will provide students with the following knowledge and skills: understanding of the fundamental concepts and theoretical models concerning the time-dependent structural effects of concrete creep and shrinkage; ability to carry out calculations to estimate 'elastic' load-effects (stresses/strains/deformations) for reinforced concrete structures (at service loads), accounting for the time-dependent effects of concrete creep and shrinkage; understanding of the fundamental concepts and theoretical models of the strain-softening behaviour of reinforced concrete (in flexure); understanding of the fundamental concepts and numerical models of ductility and moment redistribution for reinforced concrete beams; ability to quantitatively assess the ductility and moment-redistribution capacity of reinforced concrete beams; understanding of the fundamental concepts and numerical models of plastic behaviour and design for reinforced concrete beams and slabs (including yield-line analysis); ability to determine the ultimate plastic load-carrying capacity of statically-indeterminate reinforced-concrete beams and slabs; ability to use strut-and-tie models of reinforced concrete behaviour.

CIVL5277 – Structural Rehabilitation and Timber Design

A Hadigheh

This course will provide students broader knowledge in timber design and structural rehabilitation. In the first section of the subject, students will learn the engineering properties of timber and requirements to be met for specification of the design, installation and maintenance of timber structures. It includes grading and structural properties; design actions; design of timber columns, beams, tension members and connections; principles of limit state design and serviceability; methods of testing; quality standards and maintenance of timber structures based on AS 1720. 1-2010 timber structures-design methods, and AS NZS 4063. 1-2010 characterization of structural timber-test methods.

The second part covers monitoring, rehabilitation and strengthening techniques of existing structures (concrete/steel/timber/masonry). Students will be introduced to structural inspection and evaluation; durability and deterioration; destructive and non-destructive testing; and design of strengthening systems including advanced fibre reinforced polymer (FRP) materials, epoxy injection, steel plate bonding, and post tensioning according to relevant Australian, ACI and European guidelines.

CIVL6257 – Concrete Structures-Prestressed Concrete

D Dias-da-Costa

Objectives: To develop an advanced understanding of the behaviour, analysis and design of prestressed concrete structures. Outcomes: Students will develop skills in the analysis and design of prestressed concrete beams, columns and slabs, to satisfy the serviceability and strength provisions of the Australian Concrete Structures Standard. Syllabus Summary: The behaviour and design of prestressed concrete structures and structural elements, including beams and slabs. Topics covered will include steel and concrete materials, prestress losses, flexural and shear behaviour at service loads and ultimate loads, short and long term deflections, load balancing, anchorage zones (including strut and tie modelling of anchors), dynamic response of post-tensioned floors, and sustainability considerations for prestressed concrete structures.

CIVL6264 – Composite Steel-Concrete Structures

B Uy

Students will understand the basic principles for the design of composite steel-concrete structures. In particular, they will develop an understanding of the procedures required for the design of composite beams, slabs and columns. Design guidelines will reflect requirements of the Australian Standards and international codes.

CIVL6267 – Steel Structures-Advanced Analysis and Design

MR Bambach

This Unit covers: a) Principles of the design of cold-formed steel structural members, where reference is made to the Australian Standard AS/NZS4600, explaining the underlying theory for its provisions; and b) The behaviour of steel columns under transverse impact loads, where reference is made to design procedures established in the research literature. The objectives are to provide students with advanced knowledge of steel structural design and confidence to apply the underlying principles to solve a wide range of structural steel problems. This Unit will provide students with the following knowledge and skills: An understanding of the basic principles of reliability based design on steel structures; An understanding of the relationship between structural analysis and design provisions; An understanding of the background to the design provisions for cold-formed steel structures; Proficiency in applying the provisions of AS/NZS4600 to columns and beams; An understanding of the behaviour of steel columns under transverse impact; Proficiency in performing structural analyses of steel columns subjected to transverse impact loads. Syllabus Summary: Limit states design philosophy and approaches, Loading standards, Methods of analysis, Interrelationship between analysis and design, Flexural members section and member capacity, Compression members section and member capacity, Plastic collapse mechanisms and Impact resistance, of structural steel members.

CIVL6268 – Structural Dynamics

H Zhang

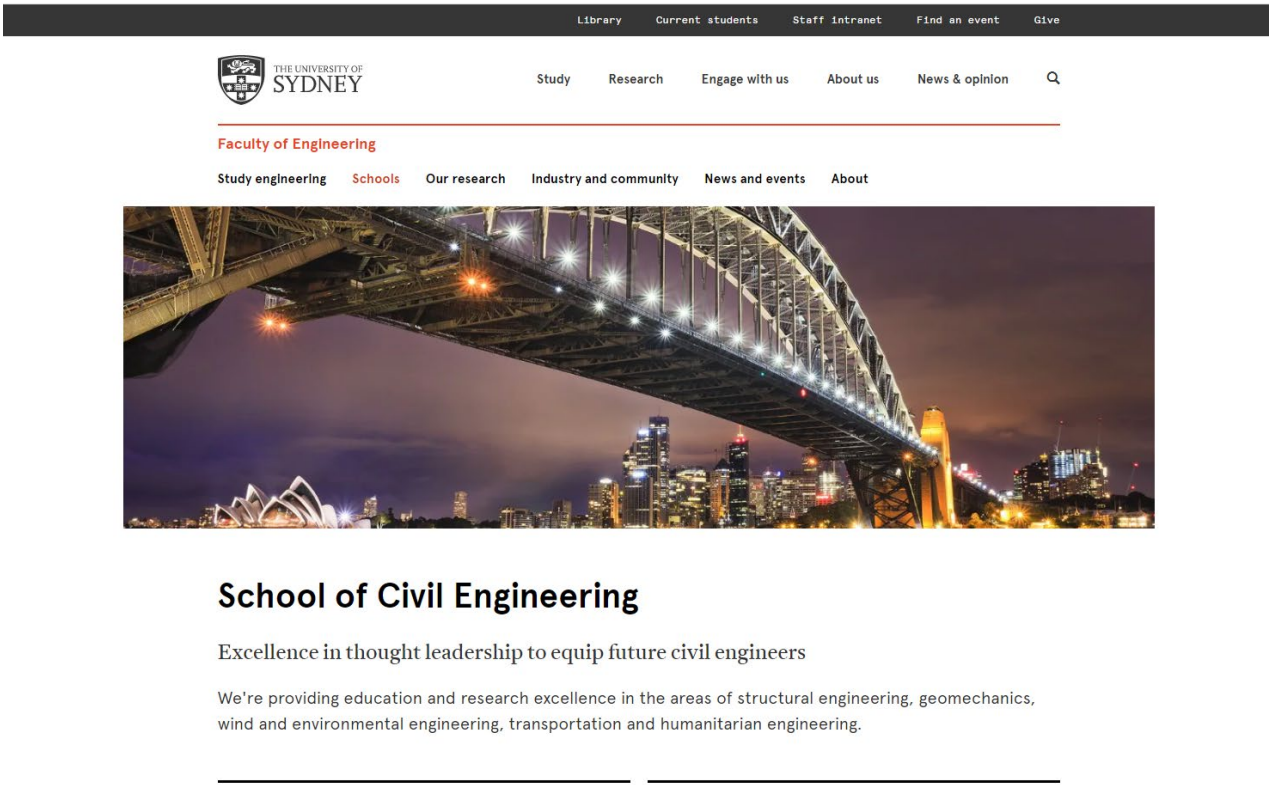
This unit introduces the fundamental concepts and theory of dynamic analysis. In a first step, free vibrations are studied and the problem of determining the natural frequency of a system is addressed. This is followed by the study of harmonically excited vibrations. While initially systems with a single degree of freedom (SDOF) are considered, the theory is generalized to cover multi-degree of freedom systems. The theory is applied to explain how structures are designed against earthquake actions with specific reference to Parts 4 of the Australian loading standard AS1170 for determining earthquake loads. This unit will provide students with the following knowledge and skills: Understanding of the fundamental concepts and definitions used in structural dynamics; Ability to calculate the natural frequency of a system using equilibrium or energy methods; Ability to determine the effect of viscous damping on the response of a freely vibrating system; Ability to determine the response of a system to a harmonic excitation; Ability to apply AS1170 Part 4 in structural design against earthquake actions; Understanding of the fundamental concepts of earthquake engineering.

Web site

The School of Civil Engineering Internet site provides much useful information about the School's services and activities: **sydney.edu.au/engineering/schools/school-of-civil-engineering.html**

Some of the features include:

- Contact details for all staff and research students;
- Information on research collaboration with industry;
- Information for students interested in studying civil engineering;
- Descriptions of the different courses;
- Information on laboratories and facilities;
- Details about consultancy and analytical services for industry;
- Downloads of software including ColdSteel, LIMSTEEL, PRFELB, PRFSA, PURLIN, SupaPurlin and THIN-WALL-2;
- Latest news; and
- Access to other areas of expertise in the School in environmental fluids and wind engineering, geomechanics and materials, transport engineering, project management and complex systems.



Investigation reports

2021

S1688 – Rasmussen K, Bambach M
Engineering investigation of the scaffold incident that occurred on 1st April 2019 at Macquarie Park.

S1689 – Mursi M
King Flex gripping efficiency testing of 12.7 mm wedges seated in King Flex 505 wedge block in accordance with AS/NZS 1314 Appendix B.

2022

S1690 – Mursi M
Tension and shear testing of corner joints for hydraulic tank installed at 1-18 Park Lane, Chippendale, NSW.

S1691 – Mursi M
Ajax gripping efficiency test of 12.7 mm wedge seated in Ajax wedge block (APP0011) in accordance with AS/NZS 1314 Appendix B.

S1692 – Mursi M
Efficiency test of Ajax anchorage (APP0010) with wedge block (APP0011) to AS/NZS 1314 Test Specimens 1/2/3.

Patents

2021

Hadigheh A
Aligned fibres and a method of making the same. World Intellectual Property Organisation Publication No: WO/2021/195701, International Application No: PCT/AU2021/050286.

Crack width measurement for post-tensioned anchor in concrete

Books

2021

Buljak V, Ranzi G
Constitutive modeling of engineering materials - theory, computer implementation and parameter identification. Academic Press.

Ranzi G (Editor)
Time-dependent behaviour and design of composite steel-concrete structures (SED 18). Structural Engineering Documents. International Association for Bridge and Structural Engineering.

2022

Hancock G
Design of cold-formed steel structures (to AS/NZS 4600:2018), 5th edition, Australian Steel Institute.

Book chapters

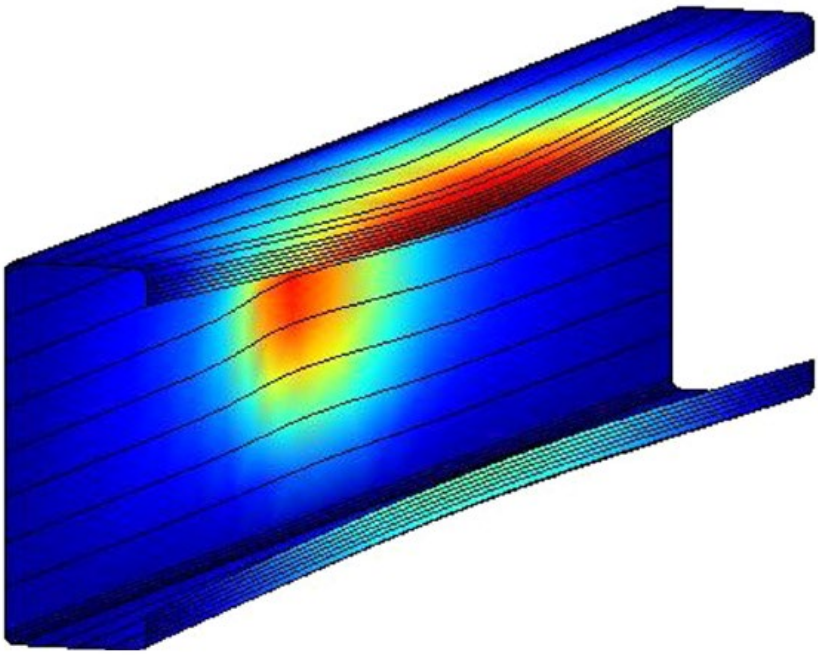
2021

Watts M, Amin A, Gilbert R, Kaufmann W
Time dependent deflection of FRC members under sustained axial and flexural loading. Serna P, Llano-Torre A, Martí-Vargas JR, Navarro-Gregori J (Eds.), Fibre reinforced concrete: Improvements and innovations, Springer, 368-379.

Yang J, Luo F, Kong W, Dong Z
Load forecasting in the short-term scheduling of DERs. Graditi G, Di Somma M (Eds.), Distributed energy resources in local integrated energy systems: Optimal operation and planning, Elsevier, 389-417.

2022

Hancock G, Pham C
Finite strip methods for stability analysis of thin-walled members with applications to the Direct Strength Method of design. Shanmugam NE, Wang CM (Eds.), Analysis and design of plated structures, Volume 1:Stability, 2nd edition, Elsevier, 177-210.



Buckling mode for channel with central localized load

Journal papers

2021

Aliabadian Z, Sharafisafa M, Tahmasebinia F, Shen L
Experimental and numerical investigations on crack development in 3D printed rock-like specimens with pre-existing flaws. Engineering Fracture Mechanics, 241.

Arrayago I, Rasmussen K
System-based reliability analysis of stainless steel frames under gravity loads. Engineering Structures, 231.

Bambach M
Experiments and crushing mechanism analysis of hybrid square metal tubes with filament wound CFRP. Composites Part C: Open Access, 6.

Barros J, Sanz B, Kabele P, Yu R, Meschke G, Planas J, Cunha V, Caggiano A, Ozyurt N, Gouveia V, Dias-da-Costa D
Blind competition on the numerical simulation of steel-fiber-reinforced concrete beams failing in shear. Structural Concrete, 22(2), 939-967.

Bybordiani M, Dias-da-Costa D
A consistent finite element approach for dynamic crack propagation with explicit time integration. Computer Methods in Applied Mechanics and Engineering, 376.

Bybordiani M, Latifaghili A, Soares D, Godinho L, Dias-da-Costa D
An XFEM multilayered Heaviside enrichment for fracture propagation with reduced enhanced degrees of freedom. International Journal for Numerical Methods in Engineering, 122(14), 3425-3447.

Chen B, Shen L, Zhang H
Gaussian process regression-based material model for stochastic structural analysis. ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part A: Civil Engineering, 7(3).

Chen S, Zhang H, Hou C, Han L, Mu T
Reliability calibration for the design of multiple-chord CFST trusses by advanced analysis. Structural Safety, 89.

Deng R, Luo F, Ranzi G, Qiu J
Real-time energy management for public laundries with demand charge tariff. The Journal of Engineering, (1), 49-59.

Deng Y, Zhang Y, Luo F, Mu Y
Operational planning of centralized charging stations utilizing second-life battery energy storage systems. IEEE Transactions on Sustainable Energy, 12(1), 387-399.

Dias-da-Costa D, Carvalho M, Bybordiani M
A cracked zone clustering method for discrete fracture with minimal enhanced degrees of freedom. Computer Methods in Applied Mechanics and Engineering, 387.

Dong W, Li W, Shen L, Zhang S, Vessalas K
Integrated self-sensing and self-healing cementitious composite with microencapsulation of nano-carbon black and slaked lime. Materials Letters, 282.

Dorri A, Luo F, Karumba S, Kanhere S, Jurdak R, Dong Z
Temporary immutability: A removable blockchain solution for prosumer-side energy trading. Journal of Network and Computer Applications, 180.

Ehsan Khan M, Shen L, Dias-da-Costa D
Crack healing performance of bacteria-based mortar under sustained tensile loading in marine environment. Cement and Concrete Composites, 120.

Ehsan Khan M, Shen L, Dias-da-Costa D
Self-healing behaviour of bio-concrete in submerged and tidal marine environments. Construction and Building Materials, 277.

El-Zein A, Airey D, Yu B, Esgandani G, Proust G, Dias-da-Costa D, Gao Y, Gan Y, Chen S
Self-repair of cracks and defects in clay: a review of evidence, mechanisms, theories and nomenclature. Acta Geotechnica, 16(12), 3741-3760.

Erkmen R, Dias-da-Costa D
Stabilization of the extended finite element method for stiff embedded interfaces and inclusions. International Journal for Numerical Methods in Engineering, 122(24), 7378-7408.

Facconi L, Amin A, Minelli F, Plizzari G
A unified approach for determining the strength of FRC members subjected to torsion - Part I: Experimental investigation. Structural Concrete, 22(6), 3763-3779.

Facconi L, Amin A, Minelli F, Plizzari G
A unified approach for determining the strength of FRC beams subjected to torsion - Part II: Analytical modeling. Structural Concrete, 22(6), 3780-3797.

Fernando P, Mohotti D, Remennikov A, Hazell P, Wang H, Amin A
Stress propagation and debonding effects in impedance-graded multi-metallic systems under impact loading. International Journal of Protective Structures, 12(1), 3-21.

Gao Y, El-Zein A, Airey D, Proust G
Autogenous sealing of a cavity in bentonite clay: An x-ray computerised tomography study. Geotechnique Letters, 11(4), 254-262.

Guo C, Li C, Zhang K, Cai Z, Ma T, Maggi F, Gan Y, El-Zein A, Pan Z, Shen L
The promise and challenges of utility-scale compressed air energy storage in aquifers. Applied Energy, 286.

Guo C, Luo F, Cai Z, Dong Z
Integrated energy systems of data centers and smart grids: State-of-the-art and future opportunities. Applied Energy, 301.

Guo C, Luo F, Cai Z, Dong Z, Zhang R
Integrated planning of internet data centers and battery energy storage systems in smart grids. Applied Energy, 281.

Hadigheh A, McDougall R, Wiseman C, Reid L
Evaluation of composite action in cross laminated timber-concrete composite beams with CFRP reinforcing bar and plate connectors using Digital Image Correlation (DIC). Engineering Structures, 232.

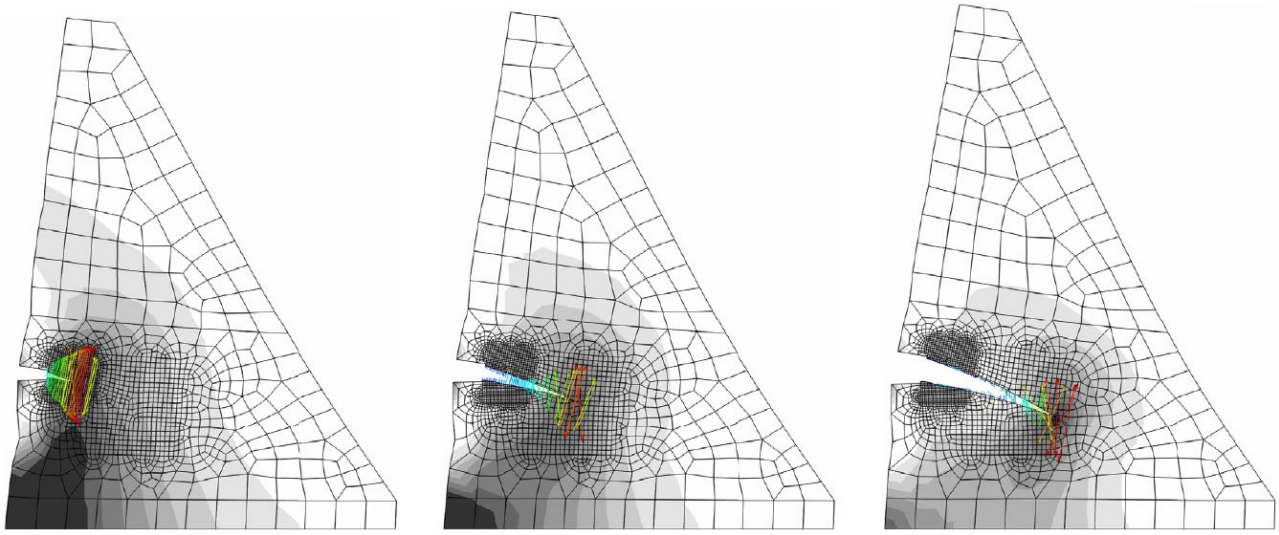
Hadigheh A, Wei Y, Kashi S
Optimisation of CFRP composite recycling process based on energy consumption, kinetic behaviour and thermal degradation mechanism of recycled carbon fibre. Journal of Cleaner Production, 292.

Hasan M, Ashraf M, Al-Deen S, Shill S, Uy B
Stainless steel top-seat angle beam-to-column connection: Full-scale test and analytical modelling. Structures, 34, 4322-4338.

Hasan N, Gu J, Jiang S, Wang H, Cabral M, Ni S, An X, Song M, Shen L, Liao X
Effects of elemental segregation on microstructural evolution and local mechanical properties in a dynamically deformed CrMnFeCoNi high entropy alloy. Scripta Materialia, 190, 80-85.

Hou G, Li Q, Song Z, Zhang H
Optimal fire station locations for historic wood building areas considering individual fire spread patterns and different fire risks. Case Studies in Thermal Engineering, 28.

Huang Y, Loschke S, Proust G
In the mix: The effect of wood composition on the 3D printability and mechanical performance of wood-plastic composites. Composites Part C: Open Access, 5.



Fracture analysis of gravity dam

Huang P, Shen L, Gan Y, Shen Y, Du D, Yu B, Maggi F, El-Zein A
Measurements of the relative permeability to CO_2-and-brine multiphase fluid of Paaratte formation at near-reservoir conditions. Greenhouse Gases: Science and Technology, 11(4), 697-711.

Huynh L, Pham C, Rasmussen K
Distortional buckling behaviour and strength of cold-rolled aluminium alloy beams. Journal of Constructional Steel Research, 187.

Jiang S, Sharafisafa M, Shen L
Using artificial neural networks to predict influences of heterogeneity on rock strength at different strain rates. Materials, 14(11).

Jiang S, Shen L, Guillard F, Einav I
Characterisation of fracture evolution of a single cemented brittle grain using in-situ X-ray computed tomography. International Journal of Rock Mechanics and Mining Sciences, 145.

Jiang S, Shen L, Guillard F, Einav I
The effect of cement material properties on the fracture patterns developing within cement-covered brittle sphere under impact. Acta Geotechnica, 16(3), 763-773.

Jiang S, Shen L, Guillard F, Einav I
Three-dimensional fabric orientation visualisation technique for distributed fractures using X-ray computed tomography. International Journal of Rock Mechanics and Mining Sciences, 142.

Jiang S, Shen L, Li W
An experimental study of aggregate shape effect on dynamic compressive behaviours of cementitious mortar. Construction and Building Materials, 303.

Jin D, Hou C, Shen L
Effect of welding residual stress on the performance of CFST tubular joints. Journal of Constructional Steel Research, 184.

Jin D, Hou C, Shen L, Han L
Numerical performance of blind-bolted demountable square CFST K-joints. Journal of Building Engineering, 33.

Kan W, Huang S, Man Z, Yang L, Huang A, Li C, Nadot Y, Cairney J, Proust G
Effect of T6 treatment on additively-manufactured AlSi10Mg sliding against ceramic and steel. Wear, 482-483.

Kang W, Hicks S, Uy B, Aslani F
Design resistance of helical seam pipe columns with limited tensile test data. Journal of Constructional Steel Research, 183.

Kazemzadeh Azad S, Li D, Uy B
Compact and slender box concrete-filled stainless steel tubes under compression, bending, and combined loading. Journal of Constructional Steel Research, 184.

Kong W, Luo F, Jia Y, Dong Z, Liu J
Benefits of home energy storage utilization: An Australian case study of demand charge practices in residential sector. IEEE Transactions on Smart Grid, 12(4), 3086-3096.

Li H, Chen T, Li W, Zhang H, Han S, Zhou C, Chen Z, Flores-Johnson E, Shen L, Lian J, Beyerlein I, Liao X
Grain size dependent microstructure and texture evolution during dynamic deformation of nanocrystalline face-centered cubic materials. Acta Materialia, 216.

Li G, Hou C, Shen L
Life-cycle analysis of FRP-strengthened offshore CFST columns suffering from steel corrosion. Composite Structures, 277.

Li P, Li W, Sun Z, Shen L, Sheng D
Development of sustainable concrete incorporating seawater: A critical review on cement hydration, microstructure and mechanical strength. Cement and Concrete Composites, 121.

Li D, Paradowska A, Uy B, Wang J, Proust G, Kazemzadeh Azad S, Huang Y
Residual stress measurements of lean duplex stainless steel welded sections. Journal of Constructional Steel Research, 186.

Lowe D, Wilkinson T, Willey K, Kadi A, Goldfinch T, Lim T
Educating the evolving engineer: Lessons from the University of Sydney. IEEE Potentials, 40(2), 7-12.

Luo F, Ranzi G, Kong W, Liang G, Dong Z
Personalized residential energy usage recommendation system based on load monitoring and collaborative filtering. IEEE Transactions on Industrial Informatics, 17(2), 1253-1262.

Mai V, Hancock G, Nguyen G, Pham C
Shear yielding and failure of cold-reduced G450 sheet steel. Journal of Constructional Steel Research, 185.

Majhi S, Mukherjee A, George N, Karaganov V, Uy B
Corrosion monitoring in steel bars using Laser ultrasonic guided waves and advanced signal processing. Mechanical Systems and Signal Processing, 149.

Marks B, Miletic M, Lee C, Zia M, Barros J, Dias-da-Costa D
Monitoring steel fibre orientation in self-compacting cementitious composite slabs during pouring with dynamic X-ray radiography. Cement and Concrete Research, 143.

Mo J, Uy B, Li D, Thai H, Tran H
A review of the behaviour and design of steel-concrete composite shear walls. Structures, 31.

Neupane K, Hadigheh A
Sodium hydroxide-free geopolymer binder for prestressed concrete applications. Construction and Building Materials, 293.

Nguyen T, Thai H, Ngo T, Uy B, Li D
Behaviour and design of high strength CFST columns with slender sections. Journal of Constructional Steel Research, 182.

Oey O, Papangelis J
Behaviour of cold-formed steel channels bent about the minor axis. Thin-Walled Structures, 164.

Peng J, Hou C, Shen L
Lateral resistance of multi-story modular buildings using tenon-connected inter-module connections. Journal of Constructional Steel Research, 177.

Peng J, Hou C, Shen L
Numerical analysis of corner-supported composite modular buildings under wind actions. Journal of Constructional Steel Research, 187.

Pham B, Pham C, Hancock G
Block shear behaviour and design of cold-formed staggered hole bolted connections. Journal of Constructional Steel Research, 180.

Pham D, Pham C, Hancock G
Development of explicit DSM for cold-formed channels under combined bending and shear. Journal of Constructional Steel Research, 182.

Pham N, Pham C, Rasmussen K
Global buckling capacity of cold-rolled aluminium alloy channel section beams. Journal of Constructional Steel Research, 179.

Pham C, Trinh H, Proust G
Effect of manufacturing process on microstructures and mechanical properties, and design of cold-formed G450 steel channels. Thin-Walled Structures, 162.

Phan D, Rasmussen K, Schafer B
Tests and design of built-up section columns. Journal of Constructional Steel Research, 181.

Reid S
Uncertain reliability of structural design standards, Structural Safety, 88.

Sabzi J, Shamsabadi E, Ghalehnovi M, Hadigheh A, Khodabakhshian A, de Brito J
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Sharafisafa M, Aliabadian Z, Tahmasebinia F, Shen L
A comparative study on the crack development in rock-like specimens containing unfilled and filled flaws. Engineering Fracture Mechanics, 241.

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Locally-enriched procedure to simulate acoustic wave propagation in discontinuous media. Journal of Sound and Vibration, 500.

Song Y, Wang J, Uy B, Li D
Behaviour and design of stainless steel-concrete composite beam-to-column joints. Journal of Constructional Steel Research, 184.

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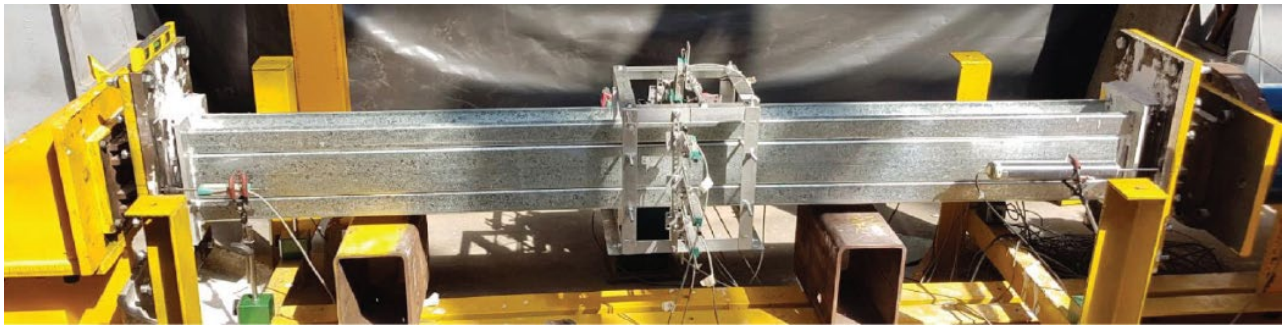

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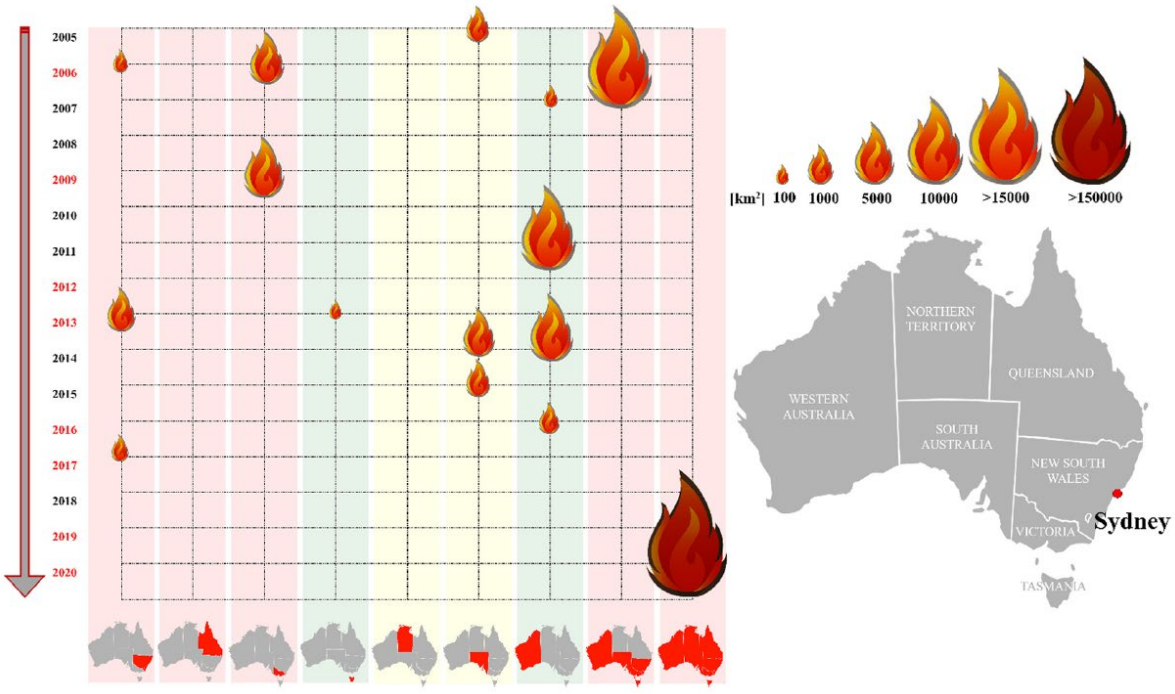

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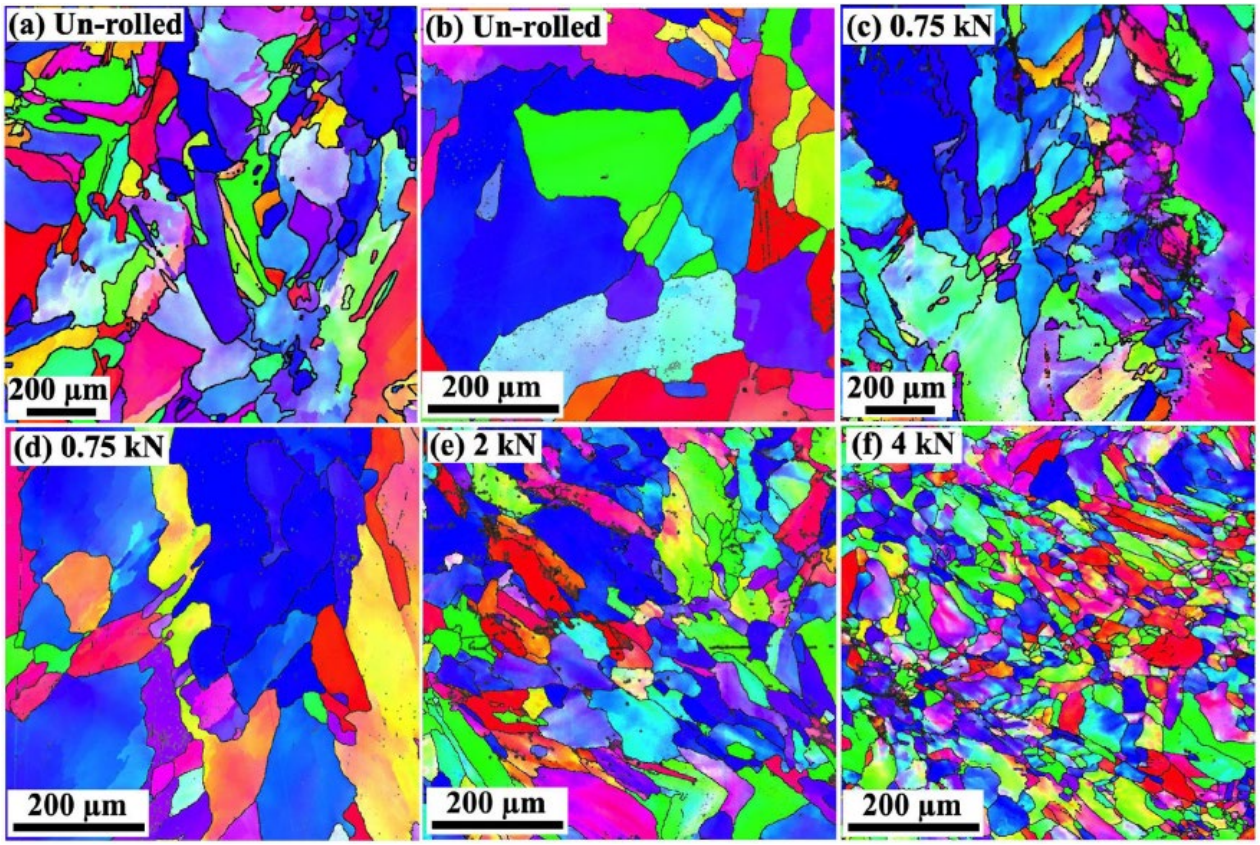

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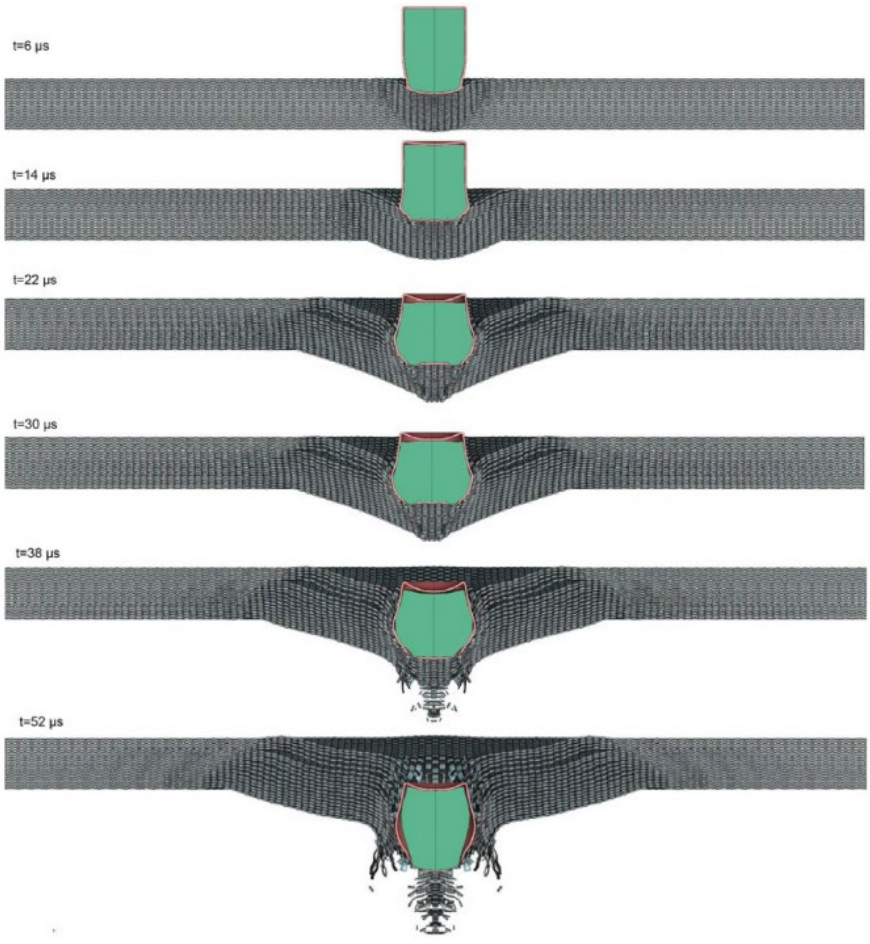

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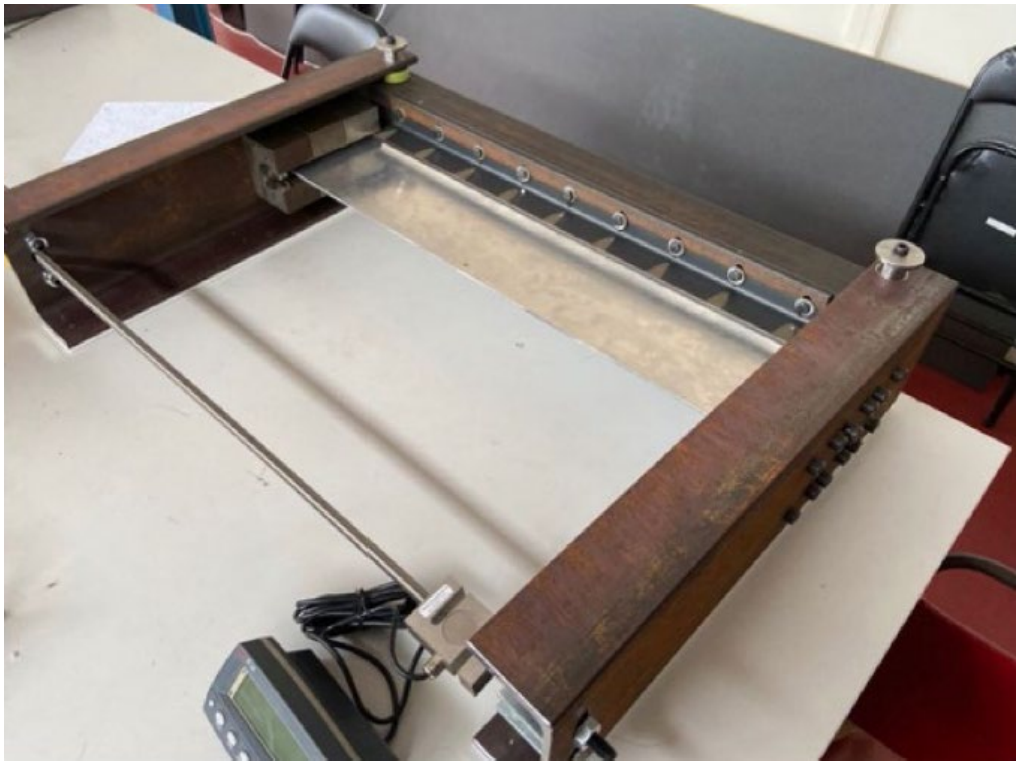

Test rig for plate supported on three edges

Conference papers

2021

Baghaei K, Hadigheh A
A machine learning approach to modelling the bond strength of adhesively bonded joints under water immersion condition. 10th International Conference on Fibre-Reinforced Polymer (FRP) Composites in Civil Engineering, Istanbul, Turkey.

Gilbert B, Dias-da-Costa D, Lebee A, Foret G
Modelling, behaviour and design of veneer-based timber circular hollow section beams. World Conference on Timber Engineering, Santiago, Chile.

Hadigheh A, Ke F
Experimental and computational assessment of durability of geopolymer concrete in corrosive environments. 30th Biennial National Conference of the Concrete Institute of Australia, Sydney, Australia.

He Y, Luo F, Ranzi G, Kong W
Short-term residential load forecasting based on federated learning and load clustering. IEEE International Conference on Communications, Control, and Computing Technologies for Smart Grids, Aachen, Germany.

Mostafa A, Lavelle M, Hadigheh A, Shankar K, Lim Y, Sirach N
Effect of combined substance sorption on the mechanical performance of carbon fibre-reinforced polymer composites. 2nd International Conference on Structural Damage Modelling and Assessment, Ghent, Belgium.

Shamsabadi E, Hadigheh A, Uy B
Vision-based crack detection: Generalisability of convolutional neural networks. 30th Biennial National Conference of the Concrete Institute of Australia, Sydney, Australia.

Wei Y, Hadigheh A
Optimising CFRP recycling via Arrhenius-type kinetic behaviour analysis. 10th International Conference on Fibre-Reinforced Polymer (FRP) Composites in Civil Engineering, Istanbul, Turkey.

You H, Papangelis J
Non-linear analysis of cold-formed steel channels in torsion, International Conference on Structural Analysis of Engineering Structures, Beijing, China.

Testing of veneer-based timber circular hollow section beams

2022

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Research on autogenous healing of cracks in clay, 20th International Conference on Soil Mechanics and Geotechnical Engineering, Sydney, Australia.

Gough P, Globa A, Hadigheh A, Withana A
Making sustainable, tangible objects with myco-materials. ACM Interactive Surfaces and Spaces Conference, Wellington, New Zealand.

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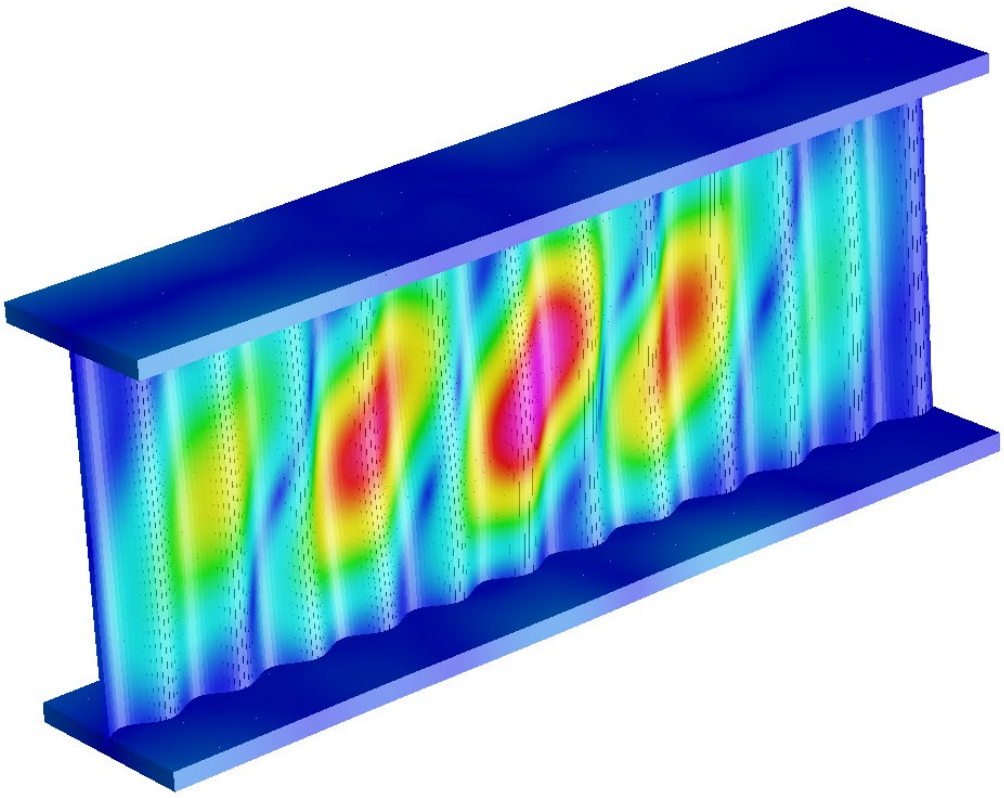

Shear buckling of beam with sinusoidal corrugated web

Postgraduate courses, seminars and lectures

2022

Amin A
Short and long term behavior of FRC elements: design according to European and Australian standards, PhD Course, University of Brescia, Italy.

Time-dependent testing of fibre reinforced concrete beams

Centre for Advanced Structural Engineering

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