THE HONG KONG INSTITUTION OF ENGINEERS
香港工程師學會

Structural Division

ANNUAL REPORT 2018/2019







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Committee Members 2018/2019

Ir TSE Kam-leung
Chairman
Architectural Services Department

Ir Edward CHAN Sai-cheong
Immediate Past Chairman

Ir Prof Ben YOUNG
Deputy Chairman
The Hong Kong Polytechnic University

Ir CHAN Chi-kong
Hon Secretary
Arcadis Design & Engineering Ltd.

Ir Jenny LAU Ching-ling
Hon Treasurer
Architectural Services Department

Ir Kenneth CHAN Wai-yee
Committee Member
Highways Department

Ir Jacky CHIONG Kam-yueng
Committee Member
Buildings Department

Ir Dr Paul LAM Heung-fai
Committee Member
City University of Hong Kong

Ir LAM King-kong
Committee Member
Housing Department

Ir Paul LEE Kai-hung
Committee Member
Hsin Chong Construction Co. Ltd.

Ir Albert LEUNG Wing-keung
Committee Member
Jacobs China Limited

Ir Prof LO Sai-huen
Committee Member
Department of Civil Engineering,
The University of Hong Kong

Ir Albert A Ray TAM
Committee Member
Buildings Department

Ir Kevin TANG
Committee Member
Greg Wong & Associates Ltd.

Ir Ben TSE Wai-keung
Committee Member
BEN TSE & Associates Ltd.

Ir Dr Simon WONG Ho-fai
Committee Member
The Technological and Higher
Education Institute of Hong Kong

Ir Thomas WONG Kam-chuen
Committee Member
YSK2 Engineering Co. Ltd.

Ir Simon WONG Kin-kwok
Committee Member
Architectural Services Department

Ir Ken NG Kin-shing
Ex-officio Member
(Council Member (Division))
Buildings Department

Ir Prof CHAN Siu-lai
Ex-officio Member
(Discipline Representative)
The Hong Kong Polytechnic University

Mr Simon PANG Hin-lam
Ex-officio Member
(AMC Representative)
AECOM Asia Company Limited

Ir Daniel SHUM Hau-tak
Ex-officio Member
(SSC Representative)

Ir Alan LAM Ho-lun
Ex-officio Member
(YMC Representative)
Highways Department

Ir Hammus CHUI Wai-ming
Co-opted Member
Housing Department

Ir LIN Siu-mun
Co-opted Member
West Kowloon Cultural District Authority

Ir LAU Chi-kin
Professional Assessment Committee
Representative
Sun Hung Kai Properties Ltd.

Ir Tony CHOI Chi-keung
Observer
Ove Arup & Partners H.K. Ltd.

Ir Patrick HOU Man-wai
Observer
Gammon Construction Limited

Ir CHIN Sai-ping
Observer
AECOM Asia Company Limited

Chairman's Report Session 2018/2019

It is indeed my greatest honor to be the 40th Chairman of the HKIE Structural Division for Session 2018/2019. Since becoming the Chairman, I have been most excited with the work of the Structural Division. Thanks to the collective efforts of the Committee Members, the Division has achieved another fruitful year, and I would like to briefly report at below.

Membership

As of April 2019, the Structural Division has a membership of 6,185 of which 302 are Fellow Members and 4,484 are Corporate Members.

Committee Major Activities

With the concerted effort of Committee Members, the Structural Division has organized some 20 activities in this session including:

- Technical meetings, seminars and site visits covering a wide range of topics
- Annual Dinner
- Structural Excellence Award
- Annual Seminar
- Annual Visit
- Structural Engineering Competition for Youth

Major Events

Annual Dinner 2018 was successfully held on 12 October 2018 at JW Marriot Hotel Hong Kong, with a full house of over 450 members and guests. Mr. Jasper TSANG Yok-sing, GBM, GBS, JP, Vice Chairman of Hong Kong Policy Research Institute and former President of the Legislative Council of the HKSAR was the Guest of Honor of the event, sharing his insight on land supply in Hong Kong.

Structural Excellence Award 2019 was conducted in March 2019. Entries are grouped into Project Award and Research & Development Award. This year we were pleased to have 13 project submissions and 8 research paper submissions selected for the finalist presentation. The Judging Panel consisted of President of the HKIE, directorate representatives from Buildings Department, Housing Department and Highways Department of the HKSAR Government, two renowned professors from overseas as well as Chairman of the HKIE Structural Division. Each submission was assessed based on the submitted documents and presentations by the participants. The award winners will be announced at the Division Annual General Meeting on 3 May 2019.

Annual Visit 2019 to Munich, Germany was held from 6 to 14 April 2019. We visited the Laboratory of Department of Civil Engineering of Munich University of Applied Sciences, two construction companies specialized in structural protection systems and modular construction techniques respectively, and the Bauma international trade fair for the construction industry. The visit enlightened us on the latest research and development in structural steel engineering, structural use of glass, structural vibration control techniques / systems, modular construction for healthcare projects, and the industry's trend of construction plant and building materials.

Annual Seminar 2019 was held on 5 March 2019 with the theme "Innovation in Structural Engineering and Construction". We were most delighted to have Ir LAM Sai-hung, JP, Permanent Secretary for Development (Works) of the HKSAR Government as our Guest of Honor and delivered a keynote speech at this major annual event. Distinguished overseas and local speakers from academia to prominent practicing professionals shared their insights, experience and innovative ideas in recent researches in structural engineering and applications in construction projects. The seminar promoted innovation and new technologies to drive forward productivity, efficiency and enhanced project delivery outcomes in the construction industry.

Inspire the Young

The Division has always placed "Inspiring the Young" an important mission and responsibility of the engineering community. For the past four years, we have had great successes with the "Structural Engineering Competition for the Youth". The fourth annual event titled "Wooden Tower Challenge" 「九層之臺，始于"壘木"！」 jointly organized with the City University of Hong Kong (CityU) and the Education Bureau of the HKSAR Government was held on 14 July 2018 in CityU. There were 30 teams from secondary schools with over 150 students participated in the competition.

Continuous Professional Development

The Division has played an important role in the development of the codes of practice for structural design in Hong Kong, and has published explanatory handbooks for the benefit of the structural engineering profession. We will soon issue a handbook for the Code of Practice for Structural Use of Steel to enhance the understanding on the design approach and application in second order analysis. We are also working on the updating of the Concrete Code Handbook and the Handbook to the Code of Practice for Foundations. We hope our members will find these handbooks helpful for their daily works and professional development as well.

We have organized various technical meetings, seminars and site visits to help support members on continuous professional development. In addition to those organized by our own, we collaborated with external institutions and bodies in conducting seminars, workshops, conferences and technical visits for professional development. Through these activities we continue to build stronger links with external parties for promoting our profession.

Chairman's Report
Session 2018/2019

Serving the Community

We have active participation in serving the community. Members are nominated to various Government committees and panels with an aim to render our professional advice to the Government in different aspects and at various stages of policy formulation, including the APSEC Discussion Forum of the Buildings Department, various standing technical committees on the drafting / review of local codes of practice of the Buildings Department, etc. Moreover, Committee Members play an important role as experts in the accreditation of university programmes, training schemes, and the assessment of application for registration as Registered Professional Engineer under the Engineers Registration Board.

The written examination of the HKIE Structural Examination was held on 7 December 2018 with 494 candidates. To help candidates prepare the examination, a seminar was held on 3 November 2018. The interview part will take place in June and July 2019. Candidates passing the HKIE Structural Examination and meeting the experience requirements will be eligible to become Corporate Member of the HKIE in the Structural Discipline.

In response to the public concerns on ground and structures settlements, a press release jointly prepared by the Structural Division and Geotechnical Division was issued by the HKIE on 24 September 2018 expressing its professional views on ground/structures settlement issues related to construction works. A public seminar titled "The Mystery of Ground Settlement" jointly organized with the Faculty of Engineering of The University of Hong Kong was also conducted on 26 September 2018 aiming at further explaining the meaning and essence of ground settlement to the general public.

Appreciation

The Structural Division has now put in place various activities for parties ranging from practicing engineers, graduated engineers, university students to secondary school students. These are thanks to the collective efforts from past Chairpersons and Committee Members and, of course, to members' participation. I would like to take this opportunity to thank all Committee Members of this session for their invaluable supports to the Division in achieving another fruitful year.

The Structural Division will continue to promote the advancement of structural engineering and to facilitate exchange of professional knowledge for members. I look forward to your active participations and continued supports to the Division.

Ir TSE Kam-leung
Chairman of the HKIE Structural Division
Session 2018/2019

The HKIE Structural Examination

The HKIE Structural Examination consists of TWO parts: (a) written examination and (b) professional interview. Applicants passing both parts and meeting the experience requirements under the relevant routes to membership will be eligible to become Corporate Member of the HKIE in the Structural Discipline (subject to meeting other requirements in the HKIE Constitution). Passing the written examination is not a pre-requisite for taking the interview or vice versa.

The written examination of the HKIE Structural Examination 2018 was held on 7 December 2018 at the AsiaWorld-Expo. It consisted of two sections in the form of multiple-choice questions (one hour) and design questions (six hours). 494 candidates attended the written examination and 110 passed with a passing rate at about 22.3%. Examination results were announced in April 2019 and the professional interview will be held in June/July 2019.

Chairman of Examination Board:

- Ir WONG Chi-ming

Chief Examiners of Design Questions:

- Ir Benny LAI Siu-lun
- Ir LAU Chi-kin
- Ir Dr James LAU Chi-wang
- Ir Charles LUK Win-kit
- Ir Kevin TANG

Chief Examiners of M.C. Questions:

- Ir Edward CHAN Sai-cheong
- Ir Prof CHAN Siu-lai
- Ir KWAN Kin-kei
- Ir LAM King-kong
- Ir Ken NG Kin-shing
- Ir Dr SU Kai-leung
- Ir TSE Kam-leung

Lastly, I would like to express my heartfelt thanks to the Examination Board Chairman, Chief Examiners, Examination Markers and Interviewers and, in particular, the SD Committee, for the dedicated efforts throughout.

Ir Prof CHAN Siu-lai
Chairman of HKIE Structural Discipline
16 April 2019

Discipline Matters

Examination Markers

Ir AU YEUNG Hoi-pang
Ir CHAN Chi-kong
Ir Maverick CHAN Chi-ming
Ir Prof Edmond CHAN Chu-fai
Ir CHAN Chung-ming
Ir Eric CHAN Kar-lock
Ir CHAN Ngai-tung
Ir Edward CHAN Sai-cheong
Ir Eddie CHAN Wah-chi
Ir CHAN Wai-ching
Ir Tony CHAN Wai-tong
Ir Dr CHENG Hon-tung
Ir CHENG Koon-yuk
Ir CHEUNG Ching-ting
Ir CHEUNG Kwok-choi
Ir Wilson CHEUNG Yiu-sun
Ir CHIK Wai-keung
Ir Jacky CHIONG Kam-yueng
Ir CHIU Chung-lai
Ir Tony CHOI Chi-keung
Ir CHONG Hing-pong
Ir CHOY Chun-chuen
Ir Prof Adam CHOY Siu-chung
Ir Dr Paul CHU Chi-keung
Ir CHU Wui-cheung
Ir Robinson CHUNG Kam-yin
Ir CHUNG Kwong-nung
Ir CHUNG Lung-to
Ir FAN Siu-kay
Ir FOK Wing-huen
Ir FUNG Ho-wing
Ir FUNG Hoi-fai
Ir FUNG King-cheong
Ir Joseph HO Chung-leung
Ir Kenith HO Ka-kit
Ir HO Koon-ho
Ir Dr Goman HO Wai-ming
Ir Stephen HOU Ting-fun
Ir David HOWE Wing-chi
Ir Dr Lilian HUI Ming-fong
Ir David HUNG
Ir Nandi IP Kwong-fat
Ir IP Wai-leung
Ir Eric KAN Shiu-kay
Ir KANG Man
Ir Paul KONG Ming
Ir KONG Shui-sun
Ir Dr KOON Chi-ming
Ir KU Kwai-yau
Ir KU Wai-ming
Ir Prof KUANG Jun-shang
Ir KUO Tung-ming
Ir KWAN Kai-sing
Ir KWAN Kin-kei
Ir Helen KWAN Po-jen
Ir Philip KWOK Chi-tak
Ir KWOK Pang-hung
Ir KWONG Po-lam
Ir Raymond KWONG Shiu-kee
Ir KWONG Wing-kie
Ir LAI Ho-cheong
Ir Otto LAI Hou-shun
Ir LAI Wai-wah
Ir Kevin LAM Chun-yin
Ir LAM King-kong
Ir LAM Ming-fai
Ir LAM Nga-yan
Ir Lysander LAM Ping-chuen
Ir LAM Tsz-fung
Ir Kenny LAM Wai-keung
Ir Dr LAU Chee-sing
Ir Dr LAU Chi-keung
Ir LAU Chi-keung
Ir Albert LAU Chi-ming
Ir William LAU Chi-yau
Ir Henry LAU Kin-houng
Ir LAU Wai-ming
Ir Dr Otto LAU Wing-hung
Ir LAU Wing-yin
Ir LAW Yu-cheong
Ir Walter LEE Kin-sun
Ir Lucas LEE Kwok-keung
Ir LEE Ping-kuen
Ir LEE Shih-ming
Ir LEE Shiu-ming
Ir LEE Wing-hong
Ir Dr Andy LEE Yuk-nin
Ir Christopher LEE Yung-ling
Ir LEI Veng-kei
Ir Ben LEUNG Chi-hung
Ir Francis LEUNG Chi-suen
Ir LEUNG Chi-wing
Ir Derrick LEUNG Hung-kwong
Ir Stephen LEUNG Kin-fung
Ir LEUNG Kin-kwong
Ir LEUNG Wai-bun
Ir LEUNG Wan-cheong
Ir LEUNG Yu-wah
Ir LI Kwok-leung
Ir LI Ting-fan
Ir Albert LIU Chi-kwun
Ir LIU Sik-wing
Ir LIU Tai-chuen
Ir Stephen LO Gon-fai
Ir Raymond LO Man-chiu
Ir LO Ting-kwong
Ir Bernard LOONG Chun-wah
Ir LUK Man-kit
Ir MAK Kin-mau
Ir MAK Kwok-shing
Ir MAK Ming-fai
Ir MAK Tsz-yee
Ir Prof Neil Colin MICKLEBOROUGH
Ir Kenneth MO Kon-fei
Ir Martin MOK Chi-wah
Ir James MOK Hing-wah
Ir NG Kin-shing
Ir NG Pak-cheong
Ir NG Tim-yeung
Ir NGAI Wai-bun
Ir PO Lap-fun
Ir PUN Chupman
Ir SETO Cheuk-ming
Ir SHAM Sai-wah
Ir SHEK Kam-cheung
Ir Claudius SO Kai-wing
Ir SO Kit-keung
Ir SO Wah-wai
Ir SO Yan-wing
Ir SONG Ngan
Ir Dr SU Kai-leung
Ir SZE Wang-cho
Ir TAI Chi-ho
Ir TAI Kwok-kuen
Ir TAM Hon-wing
Ir Benson TAM Yun-lam
Ir Calvin TANG Chi-ho
Ir Raymond TANG Wai-ming
Ir Peter TO
Ir TO Yui-kay
Ir TONG Fung-ming
Ir TSANG Chun-wing
Ir Kelvin TSANG Ping-fai
Ir Paul TSANG Sau-chung
Ir Godvin TSE Chun-kei
Ir TSE Kam-leung
Ir TSE Kin-shing
Ir TSE Pak-kin
Ir TSE Wai-keung
Ir Martin TSOI Wai-tong
Ir WAI Sai-chong
Ir WAN Koon-piu
Ir WAN Yiu-lun
Ir Allan WONG Wai-hoong
Ir WONG Bun
Ir Patrick WONG Che-ming
Ir Louis WONG Chin-to
Ir WONG Him-sun
Ir WONG Hon-ping
Ir WONG Hon-wah
Ir WONG Kai-fat
Ir Thomas WONG Kam-chuen
Ir WONG Kin-yan
Ir WONG Ko-yin
Ir WONG Kong-loi
Ir Richard WONG Kwok-chuen
Ir WONG Lai-kit
Ir WONG Wai-hing
Ir WONG Wai-ki
Ir WONG Wing-keung
Ir WONG Woon-ki
Ir WONG Yat-cheong
Ir WONG Yau-keung
Ir Andes WONG Yiu-wang
Ir WU Kwok-wai
Ir Alex WU Po-tak
Ir YAP Kin-yung
Ir Alan YAU Hoi-ngan
Ir YAU Yiu-fong
Ir YEUNG Chi-man
Ir Jenny YEUNG Fei
Ir YEUNG Yiu-wing
Ir YIP Wing-chung
Ir Maurice YUEN Chi-hung
Ir Dr Rose YUEN Mui

HKIE, Structural Division
Technical Meetings & Visits 2018 – 2019

Date	Details	Speaker
8 August 2018 (Wednesday)	Technical meeting on **"The Structural Design of 145m Span Single Layer Dome – Yujiapu Railway Station Roof"**	by Ir Dr Goman HO, Arup Fellow
26 September 2018 (Wednesday)	Technical meeting on **"Technical Seminar on Historic Building in 9-12 Yu Lok Lane"**	by Ir Ben LEUNG, C M Wong & Associates Ltd.
6 October 2018 (Saturday)	Technical visit to **"Central Kowloon Route"**	
24 October 2018 (Wednesday)	Technical meeting on **"Design of Steel H-Pile – Design, Regulation & Construction"**	by Ir Prof Adam CHOY Siu-chung, Meinhardt (C & S) Ltd
21 November 2018 (Wednesday)	Technical Meeting on **"Research and applications of open-web sandwich slabs and spatial grid box structures"**	by Prof MA Kejian, Academician of Chinese Academy of Engineering
9 January 2019 (Wednesday)	Technical Meeting on **"Footbridge B of Shatin Area 52 Phase 2"**	by Ir Sherman K.S. CHANG, Housing Department; Ir Sean L.S. WONG, Jacobs China Limited.






Date	Details	Speaker
24 January 2019 (Thursday)	Technical Meeting on **"Recent trend for structural design by Direct Analysis"**	by Ir Prof CHAN Siu-lai, The Hong Kong Polytechnic University
19 February 2019 (Tuesday)	Technical Meeting on **"Hong Kong Children's Hospital"**	by Ir Prof Adam CHOY Siu-chung and Ir Garben LAU, Meinhardt (C & S) Ltd.
5 March 2019 (Tuesday)	Annual Seminar 2019: **Innovation in Structural Engineering and Construction**	by Various Speakers
13 March 2019 (Wednesday)	Technical Meeting on **"Ambient vibration test and model updating of building"**	by Ir Dr LAM Heung-fai, CityU
9 April 2019 (Tuesday)	Technical Meeting on **"Behavior of externally confined UHSCFST columns"**	by Dr Johnny HO Ching-ming and Dr Mianheng LAI, Guangzhou University PRC
6 – 14 April 2019 (Saturday – Sunday)	Annual Visit – Munich, Germany	






Structural Engineering Competition for Youth – Wooden Tower Challenge

On 14 July 2018, "Structural Engineering Competition for Youth 2018 – Wooden Tower Challenge" co-organized by the HKIE Structural Division, Education Bureau, and the Department of Architecture and Civil Engineering of City University of Hong Kong (CityU) was held in CityU. This is the forth competition to inspire the youth to become elite engineers in the future by developing their analytical and communication skills and acquiring engineering knowledge through building and testing a wooden tower structure. The competition was a great success with over 150 participants from 30 secondary schools. Each team was given 2 hours to design and build a wooden tower with at least 700mm height on an inclined platform using only materials and tools provided by the organizer. Ten minutes were given to each team for performing the loading test. The team with the highest effective loading is the winner.

Prizes	Awardees
Champion	• NLSI Peace Evangelical Secondary School
First runner-up	• HKUGA College
Second runner-up	• Ying Wa College
Merit	• Lingnan Secondary School • CCC Kei Chi Secondary School • The HK SZE Yap C & I Association Chan Nam Chong Memorial College
Aesthetic and Innovative Prize	• Po Leung Kuk Ma Kam Ming College
Aesthetic Merit Award	• Shatin Pui Ying College • Queen Elizabeth School • HKUGA College

Annual Seminar 2019
on "Innovation in Structural Engineering and Construction"

The Annual Seminar 2019 was successfully held on 5 March 2019 at the Wang Gungwe Lecture Hall, Graduate House of the University of Hong Kong. The Seminar with the theme "Innovation in Structural Engineering and Construction", was overwhelmingly received with around 200 participants.

Ir TSE Kam-leung, Chairman of the HKIE Structural Division (2018/2019), started the Annual Seminar with the Welcoming Speech. Keynote Speech was delivered by Guest of Honor Ir LAM Sai-hung, JP, Permanent Secretary for Development (Works) of the Development Bureau of the HKSAR Government. Prominent local and overseas speakers shared their experiences, insights and ideas of innovation in recent researches in structural engineering and applications in construction projects.

Distinguished speakers included (in order of presentation): Ir Dr Wei PAN, Ir Dr Yancheng CAI, Ir Mr Patrick HOU Man-wai, Prof TAN Kang-hai, Prof Hong HAO, Ir Chris WONG Kin-por, Ir Patrick NG Wai-hong, Ir Prof CHAN Chun-man, Mr Eric LAU.

Q&A sessions open to the floor were hosted by Ir Ben TSE Wai-keung and Ir CHAN Chi-kong. The event was successfully concluded following the closing remarks by Ir Prof Ben YOUNG, Chairman of the Organizing Committee of the Annual Seminar 2019.

Organizing Committee of Annual Seminar 2019

Chairman
Ir Prof Ben YOUNG

Members
Ir CHAN Chi-kong
Ir Dr Paul LAM Heung-fai
Ir Jenny LAU Ching-ling
Ir Ben TSE Wai-keung
Ir Simon WONG Kin-kwok

Annual Dinner 2018

The Annual Dinner 2018 was successfully held on 12 October 2018 at the JW Marriott Hotel Hong Kong drawing attendance of over 450 members and guests. We were privileged to have Mr Jasper TSANG Yok-sing, GBM, GBS, JP, Vice Chairman of Hong Kong Policy Research Institute and former President of the Legislative Council of the HKSAR, as the Guest of Honor.

Other distinguished guests included Ir LAM Sai-hung, JP, Permanent Secretary for Development (Works) of the Development Bureau of the HKSAR Government, Mrs Sylvia LAM YU Ka-wai, JP, Director of Architectural Services of Architectural Services Department and Dr CHEUNG Tin-cheung, JP, Director of Buildings of Buildings Department.

Organizing Committee of Annual Dinner 2018

Chairman

Ir Ben TSE Wai-keung

Members

Ir CHAN Chi-kong
Ir Dr Paul LAM Heung-fai
Ir LAM King-kong
Ir LAU Chi-kin
Ir Jenny LAU Ching-ling
Ir Albert A Ray TAM
Ir Prof Ben YOUNG

Structural Excellence Award 2019

The Structural Excellence Award comes to over 20 years since 1998. It aims to promote excellence in structural engineering demonstrated through the design and construction of buildings and structures completed in the last two years.

There are two categories of entries, namely Projects and Research and Development (R&D). On 7 March 2019, the Judging Panel short-listed 21 finalists of Project Awards and R&D Award, followed by finalist presentations on 16 March 2019. Project Awards were decided with emphasis on Engineering Approach, Integration, Innovation / Creativity / Unusual Features, Buildability / Constructability / Safety, Energy Efficiency / Sustainability / Serviceability / Economy and Aesthetics. R&D Awards were selected on the importance to Engineering Application, Theoretical Background, Innovation / Originality and Future Impact.

3 local projects were awarded as Grand Awards and 1 research paper won the Grand Award. Below is the winner list.

Grand Award

Projects

Tai Kwun – Centre for Heritage and Arts, Hong Kong
(Category: Heritage)

Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities - Passenger Clearance Building
(Category: Infrastructures & Footbridges)

Tuen Mun-Chek Lap Kok Link Southern Connection Viaduct Section
(Category: Infrastructures & Footbridges)

R&D Award

Three-level Fire Resistance Design of FRP – Strengthened RC Beams

Members of the Judging Panel

Chairman

Ir TSE Kam-leung

Members

Prof Mark Bradford
Ir Dr HUI Ming-fong
Ir LAM King-kong
Prof LI Guo-qiang
Ir Harry MA Hon-ngai
Ir Ringo YU

Organizing Committee

Chairman

Ir Prof Ben YOUNG

Members

Ir CHAN Chi-kong
Ir Jenny LAU Ching-ling
Ir Ben TSE Wai-keung
Ir Simon WONG Kin-kwok

GRAND AWARD

Tai Kwun – Centre for Heritage and Arts, Hong Kong

Winner: Arup
Hong Kong Project - Heritage

Client: The Jockey Club CPS Limited
Structural Engineer: Arup
Architect: Herzog & de Meuron, Purcell and Rocco Design Architects Limited
Main Contractor: Gammon Construction Limited

Project Description

- Hong Kong's largest ever historic building revitalisation project, transforming the city's over 170-year-old Central Police Station compound into a new art and cultural centre.
- Led by the Hong Kong Jockey Club in partnership with the Hong Kong Government, the project involved conservation of 16 historic buildings on the declared monument site including the Police Headquarters, Central Magistracy and Victoria Prison and the addition of two iconic buildings designed by Herzog & de Meuron.
- Through seamless collaboration between the project team with support from local approval authorities, we have successfully retained, repaired and enhanced these unique historic buildings for adaptive re-use.

Project Feature

- With no record drawings nor construction information about the existing buildings, we undertook comprehensive structural survey to establish structural forms, conditions and material properties of historic buildings.
- By applying engineering principles, results from detailed site investigations and in-situ performance testing, we retained many historic elements such as timber floors, concrete floors with high strength twisted wire reinforcement and cantilever granite staircases for adaptive re-use.
- Minimum but essential structural interventions (mostly reversible) were made for adaptive re-use and stability enhancement of historic buildings.
- Balustrades were assessed using case-by-case approach and upgraded subtly to meet current regulations without affecting their authenticity.

Structural Excellence Award 2019

GRAND AWARD

Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities -Passenger Clearance Building

Winner: Highways Department & AECOM Asia Company Limited
Hong Kong Project - Infrastructures & Footbridges

Client: Highways Department
Structural Engineer: AECOM Asia Co., Ltd
Architect: Aedas Co., Ltd
Main Contractor: Leighton-Chun Wo Joint Venture
Others: Steel & Facade Specialist: Buro Happold International (Hong Kong) Ltd.

Project Description

- Passenger Clearance Building (PCB) is a remarkable landmark located at Hong Kong Port of the Hong Kong-Zhuhai-Macao Bridge (HZMB)
- Located on an artificial island of about 150 hectares.
- PCB serves as a transportation hub connecting the users of HZMB and is a gateway to the Greater Bay Area
- Construction Floor Area: over 90,000 m^2
- Main Building is composed of 3 main blocks with 2 main stories with 9m in height
- Dimension of each block: 189m x45m
- Each block is linked together by internal footbridges to facilitate the internal circulation.
- Dimensions of Steel Roof: 310m x 192m

Project Feature

- Aesthetic wave-like steel roof structures fully matches the sea surrounding the HKBCF island and reinforces clarity of wayfinding.
- Tree-like column structures create full-height atriums that allow natural daylight to penetrate and reduce the use of electric lighting system, enhancing the energy efficiency
- Adoption of innovative Modular Integrated Construction (MiC) for prefabricated steel modules with strong integration with building services works and architectural builder works in off-site prefabrication yard in Zhongshan, China.
- Prefabricated steel modules facilitate fast-track construction with high standard of quality control
- Strong integration of '3S concept' – Standardization, Single-integrated Element, and Simplification in framing plans at each block.

GRAND AWARD

Tuen Mun-Chek Lap Kok Link – Southern Connection Viaduct Section

Winner: Highways Department, AECOM Asia Company Limited, Gammon Construction Limited & Lambeth Associates Limited

Hong Kong Project - Infrastructures & Footbridges

Client: Highways Department

Structural Engineer: Lambeth Associates Ltd, Ove Arup & Partners Hong Kong Ltd, Tony Gee and Partners (Asia) Limited, YWL Engineering Pte Ltd

Architect: Ove Arup & Partners Hong Kong Ltd

Main Contractor: Gammon Construction Limited

Others: Supervising Officer: AECOM Asia Company Limited

Project Description

- design and construction for the section of Tuen Mun-Chek Lap Kok Link (TM-CLKL) connecting the southern landfall of TM-CLKL and North Lantau Highway near Tai Ho Wan
- a dual two-lane sea viaduct of approximately 1.6 km long across the sea, five link or slip road viaduct structures at the southern landfall, four link road structures at North Lantau and associated works
- the overall length of precast segmental viaduct structure is approximately 9 km
- works taking place in challenging conditions and in an area populated by an endangered species of Chinese white dolphin
- the project lasts for more than 5 years

Project Feature

Marine Pile Cap Construction

- design of match-cast shells integrated with bridge structure
- safety improvement due to reduction of 6,000 man days when labor not exposed to risk whilst working in marine conditions
- marine environmentally more friendly

Bridge Deck Erection

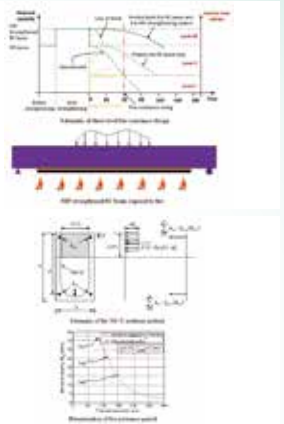
- multi-function capability of the K-Frame, enabled by its signature "K" shape and efficient, exoskeleton structure
- erection of exceptionally long spans and their associated large segments, being up to 12m deep and weighing up to 240 tons
- enhanced by the relatively light weight and high power to weight ratios of the "K-Frame Family"

Structural Excellence Award 2019

GRAND AWARD

Three-level Fire Resistance Design of FRP – Strengthened RC Beams

R&D Award



Author(s): Gao Wan-yang, Dai Jian-guo and Teng Jin-guang

Publication Date of Paper: March 21, 2018

Published Journal(s): ASCE Journal of Composites for Construction

Aims of the research / Paper abstract:

This paper for the first time presents a systematic approach for the fire resistance design of FRP-strengthened RC beams and demonstrates its use through a case study. The proposed approach caters for three different levels (i.e., Level I, Level II and Level-III) of fire insulation following the performance-based design philosophy and can be easily included in future design codes. In Level-I design, no fire insulation is provided and the FRP system is completely ignored; the RC beam itself is expected to survive the required fire resistance period. On the other extreme, Level-III design can be adopted, in which the FRP system as well as the original RC beam needs to be so insulated that they both remain effective during the required fire resistance period. Between the two extremes, Level-II design can be employed, in which a moderate level of fire insulation is provided to protect the RC beam rather than the FRP system. Although the present paper is concerned only with FRP-strengthened RC beams governed by flexural failure, the general framework and approach presented in the paper can be readily extended to other FRP-strengthened RC components as well as FRP-strengthened RC structural systems.

A brief on unusual features:

Fiber reinforced polymer (FRP) composites have been widely used in the strengthening and retrofitting of RC structures. However, the fire performance of FRP-strengthened RC structures has been a serious concern for indoor applications of the technology in buildings, particularly in densely populated areas like Hong Kong. This paper for the first time presents a systematic, step-by-step design procedure for the fire resistance design of FRP-strengthened RC beams and demonstrates its use through a case study. The above systematic approach with some modifications has been adopted by the second edition of the national "Technical Standard for FRP Composites in Construction" (under approval), which is the first design code/guidance document in the world to include such a systematic design procedure on this important issue. The design procedure and some design examples produced by the third author and his assistants using the procedure have been used to demonstrate the feasibility of using FRP to rehabilitate the Central Market Building to the Urban Renewal Authority (URA) as well as the Buildings Department (BD).

COMMENDATION MERIT

Design and Construction of Breast Cancer Foundation Kowloon Centre at Lung Cheung Road, Ngau Chi Wan, Kowloon

Winner: Chun Wo Building Construction Limited
Hong Kong Project - Non-Residential

Client: Hong Kong Breast Cancer Foundation Ltd
Structural Engineer: P&T Architects and Engineers Ltd
Architect: Tam & Philip So & Associates Ltd
Main Contractor: Chun Wo Building Construction Limited
Others: MDM Group Inc Ltd – Specialist Sub-Contractor

Project Description

- HKBCF Jockey Club Breast Health Centre (Kowloon) is a design & construction project led by Chun Wo Building Construction Ltd
- The Client is The Hong Kong Breast Cancer Foundation
- The funding organization is The Hong Kong Jockey Club Charities Trust
- The centre provides professional and convenient one-stop breast screening services, education programmes as well as comprehensive support services for patients and their family members, including emotional, informational and financial support
- The centre having a GFA of 500m^2 is built within a congested plot of 590m^2
- The project is successfully delivered based on the concept of DfMA and Digital Project Delivery

Project Feature

- Structural integration with architectural / MEP disciplines using concrete double-façade and MatrixDeck
- Adaptive building layout resolving issues of site congestion, existing trees and proximity to MTR protection zone
- Structural design with DfMA concept for ease of manufacturing (off-site) and assembly (on-site)
- Full use of BIM for aiding structural design / DfMA off-site prefabrication
- Collaboration with the academia for production of CNC-aided formwork using high density foam for feature wall and aluminium cladding
- Structural solutions with sustainability in equation, leading to use of MatrixDeck with substantial saving in construction materials
- Extensive use of nano-technologies, leading to Excellent Class of indoor air quality

COMMENDATION MERIT

Xiqu Centre, West Kowloon Cultural District

Winner: Hip Hing Engineering Company Limited
Hong Kong Project - Non-Residential

Client: West Kowloon Cultural District Authority
Structural Engineer: Buro Happold Consulting Engineers
Architect: Bing Thom Architects & Ronald Lu and Partners
Main Contractor: Hip Hing Engineering Co Ltd

Project Description

- Xiqu Centre, as the Client conceives, is an iconic public gateway to the West Kowloon Cultural District.
- It is built to become a world class venue for performance and education of Chinese opera.
- It is aesthetically unique and sustainable in terms of energy consumption.
- It seats on top of MTRC West Rail line, which create an Engineering challenge both to the Engineers and Contractor

Project Feature

- Unique facade design by folding and twisting aluminium fins to assemble the appearance of curtain on the facade.
- Amphitheatre plaza provides ample covered public space for leisure and performance.
- Adopted Synchronized Hydraulic Strand Jacks lifting (Heavy Lifting) technique to construct the hanging theatre structure. This optimized construction cost and time, and also improved working safety.
- Fully used Building Information Modelling (BIM) technique throughout the entire project from design, to building services coordination, fitting out design, fabrication and construction.

COMMENDATION MERIT

CITIC Tower, Beijing

Winner: Arup
Mainland/ Overseas Project



Client: CITIC Heye Investment Co., Ltd.
Structural Engineer: Arup (Design) and BIAD (Engineer of Record)
Architect: TFP Farrells (Concept), KPF (Design) and BIAD (Architect of Record)
Main Contractor: China Construction Third Engineering Bureau Group Co., Ltd.

Project Description

- The 528m tall tower is currently the tallest building in high seismic zone around the world.
- The elegant, curved elevation is a result of balancing of architectural form, structural efficiency and commercial needs.
- Inspired by Chinese traditional drinking vessel "Zun", the CITIC Tower has an enlarged top, which provides 20,000m^2 more leasing area to more valuable top floors and adds extra value to client.
- The structure was designed with cutting-edge parametric structural modeling and advanced finite element analysis to ensure its safety under different earthquake scenarios, which was also verified by a shaking table test.

Project Feature

- The perimeter mega frame is highly efficient for lateral resistance. The central core is concrete with steel plates embedded in critical locations which significantly improves the seismic performance of the core walls.
- The max. core wall thickness is only 1.2m which releases more effective floor areas. At ground floor, only four composite mega columns are located at corners to create a grand entrance lobby with 55m wide column-free elevation.
- Due to the limited site area the CITIC Tower has seven stories basement which was supported by bored piles at 40m below ground through 6.5m thick raft.

Structural Excellence Award 2019

COMMENDATION MERIT

Serpentine Pavilion Beijing

Winner: Arup
Mainland/ Overseas Project



Client: Hongkong Land
Structural Engineer: Arup
Architect: Jiakun Architects
Main Contractor: Gammon Construction Limited and Beijing Qiaoxin Decoration Engineering Co., Ltd

Project Description

- Located just 600m from the Forbidden City, the pavilion is the first major international co-commission since the Serpentine Pavilion programme was launched in 2000.
- The pavilion's form was inspired by an archer's bow and comprises a series of arched cantilever members stretched into position by tension wire cables.
- Advanced structural analytical techniques with the innovative use of ultra-high strength structural steel help the project team to realize the unique super-slender structural form.

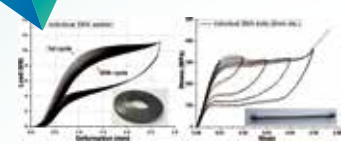
Project Feature

- The cantilever members are made up of stacked ultra-high strength steel plates bolted together using High Strength Friction Grip (HSFG) bolts to form a composite section. The intended super-slender and lightweight structural form was achieved by the adoption of ultra-high strength steel plates with a yield strength of 1180MPa.
- Parametric modelling and non-linear analysis were utilized to determine the most structurally efficient plate stacking arrangement possible, whilst providing a curved profile that was in line with the architectural intent.
- The pavilion adopted a super-slender design with a span-to-depth ratio of > 200.

COMMENDATION MERIT

R&D Award

A study of hybrid self-centring connections equipped with shape memory allow washers and bolts



Author(s): FANG Cheng, Michael C.H. YAM, CHAN Tak-ming, WANG Wei, YANG Xiao, LIN Xuemei

Publication Date of Paper: 1 June 2018

Published Journal(s): Engineering Structures

Aims of the research / Paper abstract:

This paper presents an innovative type of hybrid self-centring extended end-plate connections incorporating high-strength bolts and two basic Shape Memory Allow (SMA) elements, namely, SMA Belleville washers and SMA bolts. The connection specimens exhibited flag-shape hysteretic responses with good self-centring ability and cyclic loading repeatability. Satisfactory ductility accompanied by moderate energy dissipation capacity was also shown, and it was found that the SMA washers contributed evidently to the strength, stiffness, and energy dissipation of the connections. A numerical investigation was subsequently performed to enable a more in-depth understanding of the connection behavior, and it was further shown that increasing the preload levels of either the SMA washers or the SMA bolts could effectively increase the connection stiffness. A design model was finally proposed which enables an idealized bi-linear description of the moment-rotation responses of the hybrid self-centring connections.

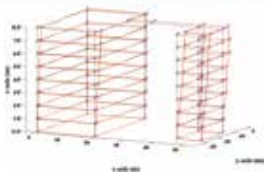
A brief on unusual features:

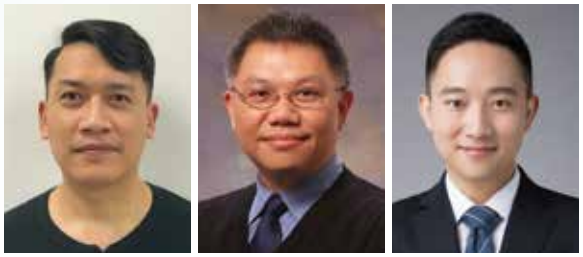
- The innovative hybrid self-centring connections with high strength bolts, SMA Belleville washers and SMA bolts (abbreviated as SMA-WB connections), is proposed.
- There are two key components of the SMA elements used for the connection, i.e., SMA Belleville washers and SMA bolts.
- Within the connection, the external SMA bolts are mainly used to provide moment resistance as well as self-centring driving force.
- Standard high strength (HS) bolts, which are used in conjunction with the SMA Belleville washer sets, are employed for the internal bolt row. The shear resistance of the connection is mainly provided by the HS bolts, and in addition, aided by the friction between the end-plate and the column face.
- The SMA Belleville washers are used to offer a certain level of rotational flexibility for the HS bolts and concurrently to promote self-centring and energy dissipation.

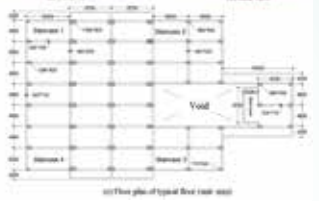
COMMENDATION MERIT

R&D Award

Operational modal identification and finite element model updating of a coupled building following Bayesian approach







Author(s): HU Jun, LAM Heung-fai and YANG Jia-hua

Publication Date of Paper: 25 September 2017

Published Journal(s): Structural Control and Health Monitoring

Aims of the research / Paper abstract:

This paper presents a comprehensive study of the full-scale ambient vibration test, modal analysis and model updating of a coupled building in Hong Kong. To capture the dynamic properties of the building, a 21-setup ambient vibration test was designed and conducted. The modal parameters were identified following a fast Bayesian FFT approach, and the partial mode shapes were assembled following the least-squares method. To determine the equivalent Young's moduli of various structural components, an FE model of the coupled building was developed and updated with the identified modal parameters. To ensure the model updating method is applicable even in unidentifiable cases, a Markov chain Monte Carlo (MCMC) simulation was employed in the proposed method to generate samples for approximating the posterior probability density functions (PDFs) of uncertain model parameters. This study provides valuable experience and information for the development of structural model updating and structural health monitoring of building systems.

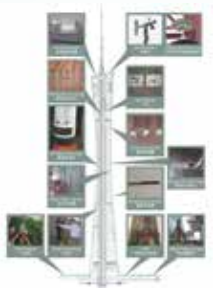
A brief on unusual features:

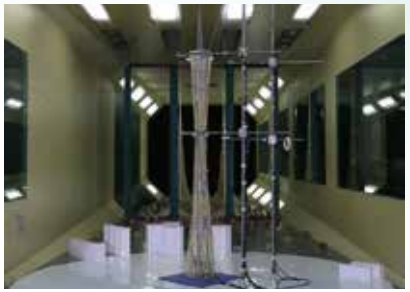
- This manuscript is the very first one that goes through the step-by-step procedures from vibration test to model updating without making any ad hoc assumption.
- The newly developed Bayesian methodology explicitly handles the uncertainties induced from measurement noise and modeling error.
- The use of Markov chain Monte Carlo (MCMC) simulation in approximating the posterior probability density function (PDF) of uncertain parameters ensures the robustness of the methodology.
- The manuscript covers not only the theoretical development but also the experimental verification using field test data. Unlike many probabilistic methods from the literature, the proposed methodology was verified using a complicated building structure instead of computer simulations or small-scale models under laboratory conditions.
- The research work in the manuscript clearly demonstrates the feasibility of structural model updating on an existing building following the Bayesian approach. This is essential for the future development of practical algorithms utilizing measured data for SHM.

COMMENDATION MERIT

Typhoon- and Temperature-induced Quasi-static Responses of a Supertall Structure

R&D Award





Author(s): SU Jia-zhan, XIA Yong,ZHU Le-dong, ZHU Hong-ping, NI Yi-qing

Publication Date of Paper: 15 July 2017

Published Journal(s): Engineering Structures

Aims of the research / Paper abstract:

In this study, the wind- and temperature-induced quasi-static responses of the 600 m-tall Canton Tower are investigated using a comprehensive long-term structural monitoring system installed on the structure. The structural responses (stresses and displacement) obtained from the field monitoring system during a strong typhoon are presented. The temperature-induced responses are calculated by applying a temperature loading model to the finite element model of the structure. The purely typhoon-induced quasi-static responses are then separated from the total measured responses by subtracting the temperature-induced ones. It shows that the typhoon-induced quasi-static responses of the supertall structure are slightly smaller than the temperature-induced responses on a typical sunny day. The typhoon-induced quasi-static displacement obtained from the field is also compared with the counterpart from the wind tunnel test on an aeroelastic model of the full tower.

A brief on unusual features:

The present paper is the first study addressing the importance of temperature-induced quasi-static responses of supertall structures and separating it from typhoon-induced ones. Researchers and engineers usually pay more attention to typhoon-induced dynamic responses of supertall structures but less on the temperature-induced quasi-static ones. However, the present study on the 600-m-tall Canton Tower showed that the latter was similar to the former. The temperature- and typhoon-induced quasi-static responses were then separated through the numerical analysis with inputs from the comprehensive monitoring system of the supertall structure. Results from the field monitoring, numerical analysis, and wind-tunnel test were cross-checked and showed a good agreement. Results presented in this study will benefit researchers and engineers in better understanding temperature behaviors of supertall structures and provide design suggestions for future supertall structures.

FINALIST

The Mills

Winner: AECOM Asia Company Limited

Hong Kong Project - Heritage

Client: Nan Fung Group

Structural Engineer: AECOM Asia Company Limited

Architect: Thomas Chow Architects Limited

Main Contractor: Paul Y Engineering Limited

Project Description

- The Mills is a landmark revitalization project completed in 2018. With a total gross floor area of approximately 12,000 square meters, the project consists of three multistory buildings named Mill 4, Mill 5 and Mill 6.
- The Project is to revitalize the textiles manufacturing factory building into a complex with the provision of retail, gallery, and culture, exhibition art space.
- Structural modification work of this project includes removal of portions of the structure, beam and column strengthening works, large floor voids, new staircase, change of floor usage, construction of curtain wall and skylight.

Project Feature

- Foundation was retained and reused in this project. Structural strengthening works are designed to integrate with the heritage conservation design intent.
- The large area of floor in first floor and second floor of Mill 6 were removed to create an atrium with skylight, which lights up the whole Mill 6 floors.
- In Mill 5, spectacular curtain wall replaced the dark, concrete external wall to provide natural lighting.
- New connections were made through the construction of glass link bridges with fire rated glass flooring joining the originally isolated Mill 5 and 6.

FINALIST

Residential Redevelopment of No. 3 MacDonnell Road

Winner: AECOM Asia Company Limited
Hong Kong Project – Residential



Client: Chinachem Group
Structural Engineer: AECOM Asia Company Ltd.
Architect: Willey Construction Co. Ltd.
Main Contractor: AECOM Asia Company Ltd.
Others: Willey Construction Co. Ltd.

Project Description

- The property comprises of 24 luxury units with total GFA approx. 6200m^2.
- The development consists of three simplexes and 20 duplex units.
- There is one super duplex unit with private outdoor space and swimming pool.
- The duplex layout with private lift lobby ensures absolute privacy to all prestigious tenants.
- The home automation system is proposed that enables tenants to adjust lighting and curtains at the touch of a button.

Project Feature

- Integration with basement wall and soldier pile wall to save basement space, reduce basement floor and can achieve the architectural layout at basement floor.
- Wind tunnel test is adopted with overall 10% reduction of reinforcement and simulate real wind pressure in façade design.
- BIM implementation to save coordination period, minimizing of abortive works and easy coordination between basement contractor and main contractor.
- Spiral blade diaphragm action to resist the lateral soil load for the deep basement structure
- Integration of stone cladding façade, including IGU glass, architectural profile stone panel and decorative aluminum panel.

FINALIST

Victoria Dockside, Hong Kong

Winner: Arup
Hong Kong Project - Non-Residential



Client: New World Project Management (Hong Kong) Ltd
Structural Engineer: Arup
Architect: Kohn Pedersen Fox Associates and Ronald Lu & Partners (Hong Kong) Ltd
Main Contractor: New World Construction Company Ltd

Project Description

- Victoria Dockside is a vibrant mixed-use development in the Kowloon Peninsula that reshapes the Tsim Sha Tsui harbourfront.
- The 274,000m^2 mega scale redevelopment project comprises a 66-storey, 280m tall tower for office and hotel use, a 13-storey hotel building standing on an 8-storey retail podium with a 4-level basement.
- The project's masterplan was created by Kohn Pedersen Fox in collaboration with over 100 designers and consultants across the globe.
- Overcoming a number of site constraints and a tight schedule, Victoria Dockside is set to be the flagship project that pushes new frontiers in art, design, business, leisure and sustainability.

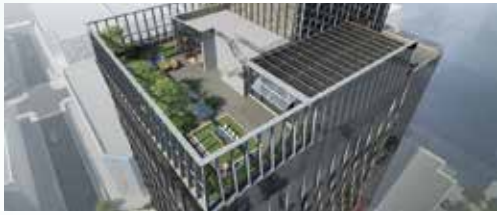
Project Feature

- The mixed-use commercial tower is divided into three functional zones – office, hotel and hotel apartment, each with different structural system adopted for flexible E&M routing, functional transition and building setbacks.
- The structural design of the retail podium and hotel tower suits different functional and aesthetic design including cinema boxes, visual corridor, skybridge, and roof terrace.
- The 4-level new basement was constructed by fully utilizing the existing slurry wall as the temporary walling to minimize the use of extensive struts and waling system, and thus the impact to the adjacent structures and the operation of the adjacent hotel.

FINALIST

Winner: Atkins China Limited
Hong Kong Project – Non-Residential

FT Life Tower (New Kowloon Inland Lot 6311)



Client: Sanefire Company Limited
Structural Engineer: Atkins China Limited
Architect: AGC Design Limited
Main Contractor: Hip Hing Construction

Project Description

Background

- 23 stories tall, 120m tall office building
- 3 stories, 14m deep basement
- Grade-A commercial building at Kowloon Bay Business Area
- Provide approximately 339,000 ft^2 retail and office space

Structural Form

- Reinforced concrete structure
- Conventional beam-slab-column/wall superstructure
- Reinforced concrete screen wall around basement
- Combination of large and small pile caps connected with strap beams
- Rock socketed steel H-pile foundation

Project Feature

Titanium Cladded Front Entrance

- High strength to weight ratio
- Naturally resistance to rust and corrosion
- Highly Recyclable
- Rare construction material in Hong Kong
- Tailor-made connection details and installation sequence

3 Dimensional Layering Curtain Wall

- Podium Curved Glass Wall
- Alternating inclined and reclined glass panel curtain wall
- Imitate texture of woven cloth, homage to HKPI's original garment business

Sustainable Design

- Laminated glass panels reflecting heat and light away from building
- Skylights to allow controlled natural light into the building
- Greenery Podium Garden on 2/F
- Sky Court on 26/F
- Rainwater recycling plantation system for gardening purpose to reduce public water usage

FINALIST

A&A Work at 122-126 Queen's Road Central

Winner: C M Wong & Associates Limited
Hong Kong Project - Non-Residential

Client: Platform Development Limited
Structural Engineer: C M Wong & Associates Ltd
Architect: A.Lead Architects Ltd.
Main Contractor: Win Lee Building Engineering Ltd.

Project Description

To renovate the existing building and change of use from B/F to 3/F from office to shop

Project Feature

- Structural wall opening at G/F and 1/F for Lift opening;
- Enlargement of structural wall opening from B/F to 3/F for means of escape and ad;
- Addition of floor slabs at 2/F and 3/F by inverted portal frame structures;
- Enlargement of roof floor by inverted portal frame.

FINALIST

Kwai Chung Hospital Day Recovery Centre

Winner: Architectural Services Department & Wong Pak Lam & Associates Consulting Engineers & Architects Limited

Hong Kong Project – Non-Residential

Client: The Food and Health Bureau & Hospital Authority
Project Manager: Architectural Services Department
Structural Engineer: Wong Pak Lam & Associates Consulting Engineers & Architects Ltd.
Architect: Andrew Lee King Fun & Associates Architects Ltd.
Main Contractor: Chun Wo Construction and Engineering Co. Ltd.

Project Description

- The new Kwai Chung Hospital Day Recovery Centre, which comprises a 5-storey high building with car park, provides clinical facilities and supporting facilities to Kwai Chung Hospital (KCH) and acts as a 'decanting building' to facilitate the redevelopment of KCH under 10-year Hospital Development Plan.
- The site is about 100m x 60m and is located at the existing car park area of Princess Margaret Hospital (PMH), which is bounded by the existing Block G, M, N and K compound of KCH together with Block J and Specialist Out-patient Clinic of PMH.

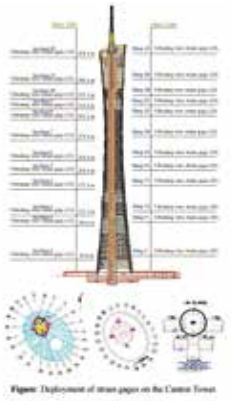
Project Feature

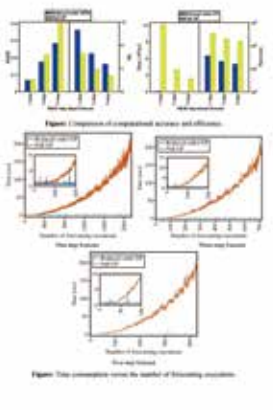
- Fast-track programme (schematic design to completion in 24 months).
- Existing car park structure is reused and integrated into the new building.
- Pioneer use of off-site prefabricated steel reinforcing bar products supplied by the approved off-site prefabrication yard on the "List of Approval Steel Reinforcing Bar Prefabrication Yards".
- Use of semi-precast slab to implement 3S concept to cater for single vehicular access, and limited working space and storage area
- Stringent requirement on noise and vibration control during construction of the new building.
- Use of BIM for design and coordination of BS and building structure to facilitate the construction planning.

FINALIST

R&D Award

Bayesian Modeling Approach for Forecast of Structural Stress Response Using Structural Health Monitoring Data





Author(s): WAN Hua-ping, NI Yi-qing
Publication Date of Paper: June 19, 2018
Published Journal(s): Journal of Structural Engineering, ASCE

Aims of the research / Paper abstract:

The advancement in structural health monitoring (SHM) technology has been evolving from the monitoring-based diagnosis to the monitoring-based prognosis. The structural stress response is increasingly used for structural condition diagnosis and prognosis, since it can be directly used to indicate the safety reserve of a structural component or provide information regarding the load-carrying capacity of the whole structure. Therefore, accurate forecasting of structural stress responses is an essential step for the reliable diagnosis and prognosis of structural condition. We propose a Bayesian modeling approach with Gaussian processes (GPs) prior and moving window strategy, which allows for probabilistic forecasts of structural stress responses and is computationally efficient. The feasibility of the reduced-order GP-based Bayesian modeling approach is illustrated using the real-time monitoring-derived stress data acquired from a supertall structure. The results indicate that the proposed approach holds higher computational accuracy and efficiency for stress response forecasts.

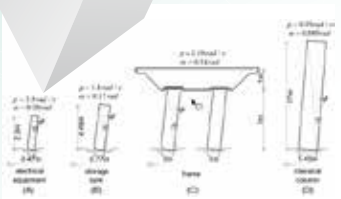
A brief on unusual features:

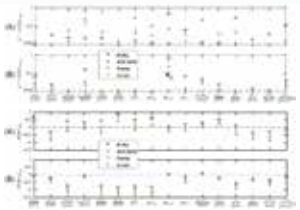
- A Bayesian modeling approach with Gaussian process (GP) prior is explored for forecast of structural stress responses. The proposed method not only allows modelers to estimate the uncertainty in prediction, but also maintains the attractive data-driven feature that ensures a high modeling flexibility and great expressive power.
- A reduced-order GP modeling method with moving window strategy is developed to enhance computational accuracy and efficiency in forecasting. The proposed moving window strategy is able to reduce the size of the training dataset, thus leading to a considerable relief in the computational burden associated with the forecasting task using Bayesian modeling approach with Gaussian process (GP) prior.

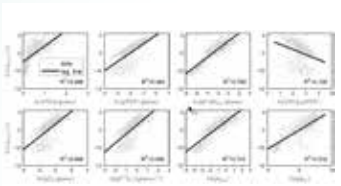
FINALIST

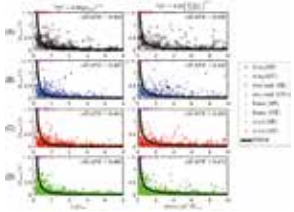
R&D Award

Rocking amplification and strong motion duration









Author(s): Anastasios I. GIOUVANIDIS, Elias G. DIMITRAKOPOULOS
Publication Date of Paper: 22 April 2018
Published Journal(s): Earthquake Engineering and Structural Dynamics

Aims of the research / Paper abstract:

This paper characterizes the ability of natural ground motions to induce rocking demands on rigid structures. In particular, focusing on rocking blocks of different size and slenderness subjected to a large number of historic earthquake records, the study unveils the predominant importance of the strong-motion duration to rocking amplification (i.e. peak rocking response without overturning). It proposes original dimensionless intensity measures (IMs), which capture the total duration (or total impulse accordingly) of the time intervals during which the ground motion is capable of triggering rocking motion. The results show that the proposed duration-based IMs outperform all other examined (intensity, frequency, duration, and/or energy-based) scalar IMs in terms of both "efficiency" and "sufficiency." Further, the pertinent probabilistic seismic demand models offer a prediction of the peak rocking demand, which is adequately "universal" and of satisfactory accuracy. Lastly, the analysis shows that an IM that "efficiently" captures rocking amplification is not necessarily an "efficient" IM for predicting rocking overturning, which is dominated by the velocity characteristics (e.g. peak velocity) of the ground motion.

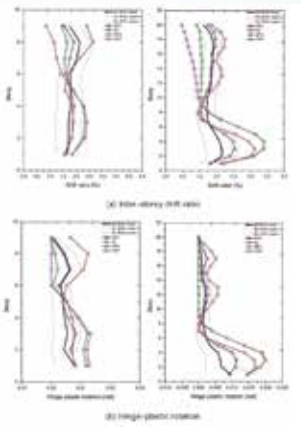
A brief on unusual features:

- The results unveil that the time intervals during which the ground motion is capable of triggering rocking motion have a dominant importance on rocking amplification.
- Intensity measures (IMs) based on the uniform duration and the cumulative absolute velocity of exceedance show a strong positive correlation with the rocking demand, outperform all examined IMs, are liberated from the structural response, and provide an estimation of the structural demand that is independent from seismological parameters (i.e. the magnitude and the source-to-site distance).
- The proposed probabilistic seismic demand models are adequately invariant for different structural configurations indicating an approximately "universal" behavior.
- The analysis indicates that the proposed probabilistic seismic demand models return an acceptable prediction error given the frail nature of rocking dynamics and the inherent uncertainty level in earthquake engineering.
- The study also shows that a scalar IM that "efficiently" captures rocking amplification is not necessarily an "efficient" IM for rocking overturning prediction.

FINALIST

R&D Award

Spectrum-based pushover analysis for estimating seismic demand of tall buildings



Author(s): LIU Yang, J S KUANG
Publication Date of Paper: 11 April 2017
Published Journal(s): Bulletin of Earthquake Engineering

Aims of the research / Paper abstract:

A quick and accurate estimate of seismic demands of tall buildings is one of the most important issues in the seismic evaluation of structures. This paper proposes a quick, yet effective, method of analysis, named as spectrum-based pushover analysis (SPA) method, to estimate the seismic response of tall buildings. In the SPA procedure, the very complex and complicated dynamic coupling effect of different modes of the nonlinear seismic performance of a building is simplified, and the consecutive pushover technique is adopted to consider the simplified coupling effect. Comparison of the results obtained from NLRHA, two of the most famous multi-mode pushover analysis methods and the proposed SPA method is made. The seismic demands from the SPA are very close to those of NLRHA. Owing to its accuracy, effectiveness, and spectrum-based calculation procedure, the proposed SPA procedure is a very promising tool for predicting the seismic demand of tall buildings.

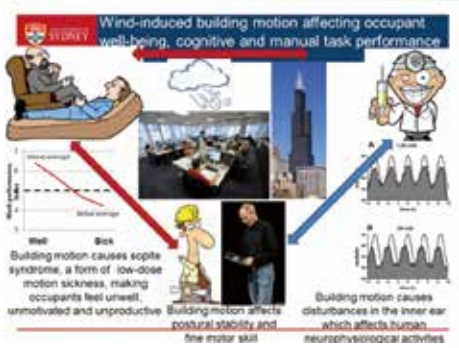
A brief on unusual features:

- A novel and verified method of analysis, named Spectrum-based Pushover Analysis (SPA), is developed.
- To achieve an effective and quick estimation, the very complex and complicated dynamic coupling effect of vibration modes relating to the nonlinear seismic performance of a tall building is simplified. The consecutive pushover technique is then used to consider the simplified coupling effect, while the contribution of different modes and the target displacement is evaluated from the response spectrum analysis using the design spectrum.
- To verify the applicability, effectiveness and accuracy of the proposed SPA method, example high-rise buildings are used for analysis.
- It has been shown from the comparison of the results from the nonlinear response time history analysis (NLRHA), conventional advanced pushover analyses, and the proposed spectrum-based pushover analysis that the SPA method can estimate the seismic demands effectively while the predictions show very good agreement with those of NLRHA.

FINALIST

R&D Award

The fundamental human response to wind-induced building motion



Author(s): Steve LAMB, Kenny KWOK
Publication Date of Paper: 10 March 2017
Published Journal(s): Journal of Wind Engineering and Industrial Aerodynamics

Aims of the research / Paper abstract:

This paper identifies seven areas where an increase in our fundamental understanding of the human response to building motion will facilitate the design of next-generation serviceability criteria for wind-induced building motion. These advances in knowledge address: (1) understanding the effects of wind-induced building motion on occupants, (2) metrics for building performance assessment, (3) understanding of habituation to building motion, (4) potential and real benefits of education, (5) motion characteristics to predict adverse occupant effects, (6) differentiation between residential and office serviceability criteria, and (7) multidisciplinary research methods and measures used in occupant comfort research. Each is discussed with reference to engineering literature and incorporates a multidisciplinary perspective including psychological and physiological research. Finally, methodological issues in the occupant comfort literature are discussed and recommendations for future research are offered to facilitate the design of next-generation serviceability criteria for wind-induced building motion.

A brief on unusual features:

- Current building motion design guidelines focus on motion perception and complaint rates, which are insufficient to ensure a healthy and productive work environment.
- The effects of building motion on test subjects were studied using motion simulators by adopting multi-disciplinary methodologies drawn from engineering, psychology and neuro-physiology.
- A large-scale field study was conducted over 8 months in Wellington New Zealand of building occupant response to wind-induced building motion in office buildings under real-life working conditions.
- The results of these studies clearly demonstrated that building motion can significantly affect the wellbeing of office workers and their work performance due to motion-induced sopite syndrome, an early onset motion sickness characterized by distractibility, drowsiness, low motivation and depressed mood.
- This paper highlights the knowledge gap, proposes future research, and facilitates changes to building serviceability criteria to revolutionalise the design of future wind-sensitive buildings that promotes health and wellbeing and lifts work performance and productivity.

BEST REPORTER AWARDS 2019

Best Reporter Awards were introduced in November 2005 to encourage participation in the events organized by the Structural Division; to promote interests in the respective themes of the events; and to promote report writing skills among members.

Date	Winner	Report Title
9 January 2019	Ir Thomas CHIU Kwok-lin	Technical Meeting on Footbridge B of Shatin Area 52 Phase 2

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