

Spotlight on Structures

Research Journal of The Institution of Structural Engineers

In this section we shine a spotlight on papers recently published in *Structures* – the Research Journal of The Institution of Structural Engineers.

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Impact statement

We are pleased to present the latest impact statement published in *Structures*. Impact statements are intended to highlight papers in which the work is likely to have a more immediate impact on practice and which will, consequently, be of greater interest to practising engineers.

Advanced Materials for Concrete-Filled Tubular Columns and Connections

Ana Espinos, Manuel L. Romero, Antonio Hospitaler, Ana M. Pascual and Vicente Albero
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This work provides recommendations to practitioners on the efficient use of currently available advanced materials, applied to Concrete Filled Steel Tube (CFST) columns and their connections. It aims to increase both the load-bearing capacity and fire resistance of these solutions. The benefits of High Strength Steel (HSS), Fire-Resistant (FR) steel and geopolymer concrete applied to CFST columns are discussed. In addition, the application to blind-bolts of other advanced and innovative materials, such as Shape Memory Alloys (SMA), as well as the above-mentioned FR steels, has been analysed at both room temperature and in fire conditions.

The research demonstrated that the effectiveness of these advanced

materials depends on the configuration of the column cross-section and on which part of the section the innovative materials are applied to. For double-tube columns, it was found that HSS placed in the outer tube is an effective way to increase their maximum capacity at room temperature. Furthermore, it was shown that both HSS and FR steel applied in the inner tube, as well as geopolymer concrete placed at the ring between the outer and the inner tube, may increase the double-tube columns' fire resistance time. As a reference, it was shown that the fire resistance of a double-tube column can be increased by 28% with the use of S960 steel, and by up to 39% if FR steel is employed. The fire resistance can be further increased by 55% if geopolymer concrete is placed at the ring between the outer and inner tube.

Innovative solutions for beam to CFST column connections were also studied. Blind-bolted connections were found to have limited capacity in a fire due to deterioration of the bolt shank. In this case, the use of FR steel bolts may allow an increase of 20% in ultimate capacity, which may be significant depending on the fire requirements. The benefits of using SMA were also studied, and it was shown that the superelastic effect of this material can enhance the performance of blind-bolted connections under cyclic loads.

(Read the full paper at [www.structuresjournal.org/article/S2352-0124\(15\)00100-9/fulltext](http://www.structuresjournal.org/article/S2352-0124(15)00100-9/fulltext))

Articles in press

The following articles have recently been made available online:

Effects of Welding on the Tensile Performance of High Strength Steel T-stub Joints

Cheng Chen^a, Xingzhao Zhang^a, Mingshan Zhao^a, Chi-King Lee^c, Tat-Ching Fung^a and Sing-Ping Chiew^b

^a School of Civil and Environmental Engineering, Nanyang Technological University, Singapore

^b Singapore Institute of Technology, Singapore

^c School of Engineering and Information Technology, University of New South Wales Canberra, Australia

<http://dx.doi.org/10.1016/j.istruc.2016.09.008>

Finite Element Analysis on Mechanical Performance of Middle Long CFST Column with Inner I-Shaped CFRP Profile under Axial Loading

Guochang Li, Ranrui Zhang, Zhijian Yang and Bing Zhou, School of Civil Engineering, Shenyang Jianzhu University, Shenyang, China

<http://dx.doi.org/10.1016/j.istruc.2016.09.007>

Structural Behaviour of Beam to Concrete-filled Elliptical Steel Tubular Column Connections

J. Yang, T. Sheehan, X. Dai and D. Lam, School of Engineering, University of Bradford, Bradford, UK

<http://dx.doi.org/10.1016/j.istruc.2016.09.005>

Performance of Partially Encased Composite Beams Under Static and Cyclic Bending

Yiyi Chen^{a,c}, Wei Li^b and Cheng Fang^c

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Shanghai, China

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^c Department of Structural Engineering, School of Civil Engineering, Tongji University, Shanghai, China

<http://dx.doi.org/10.1016/j.istruc.2016.09.004>

Effect of Notch Depth & Location on Modal Natural Frequency of Cantilever Beams

Shravan H. Gawande and Rudesh R. More, Department of Mechanical Engineering, M.E. Soicetys College of Engineering, Pune, S.P. Pune University, India

<http://dx.doi.org/10.1016/j.istruc.2016.09.003>

Vectorised graphics processing unit accelerated dynamic relaxation for bar and beam elements

A. Liew, T. Van Mele and P. Block

<http://dx.doi.org/10.1016/j.istruc.2016.09.002>

Construction Aerodynamics of Cable-Stayed Bridges for Record Spans: Stonecutters Bridge

S.H. Robin Sham^a and Tom A. Wyatt^b

^a Global Long Span and Specialty Bridge Director, AECOM

^b Reader Emeritus, Imperial College London, UK

<http://dx.doi.org/10.1016/j.istruc.2016.08.010>

Experimental Study of Interfacial Stress Distribution of Bonded-in BFRP Rod Glulam Joints Using Fibre Optic Sensors (FOS)

David Yeboah^a, Su Taylor^b and Danny McPolin^b

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^b School of Planning, Architecture and Civil Engineering, Queen's University Belfast, UK

<http://dx.doi.org/10.1016/j.istruc.2016.08.006>

Study on the Bending Capacity of Cold-formed Stainless Steel Hollow Sections

Baofeng Zheng^a, Ganping Shu^a, Lianchun Xin^b, Ran Yang^c and Qinglin Jiang^d

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Design Co. Ltd., Hefei, China

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<http://dx.doi.org/10.1016/j.istruc.2016.08.007>

Modeling of circular concrete-filled steel tubes subjected to cyclic lateral loading

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<http://dx.doi.org/10.1016/j.istruc.2016.08.008>

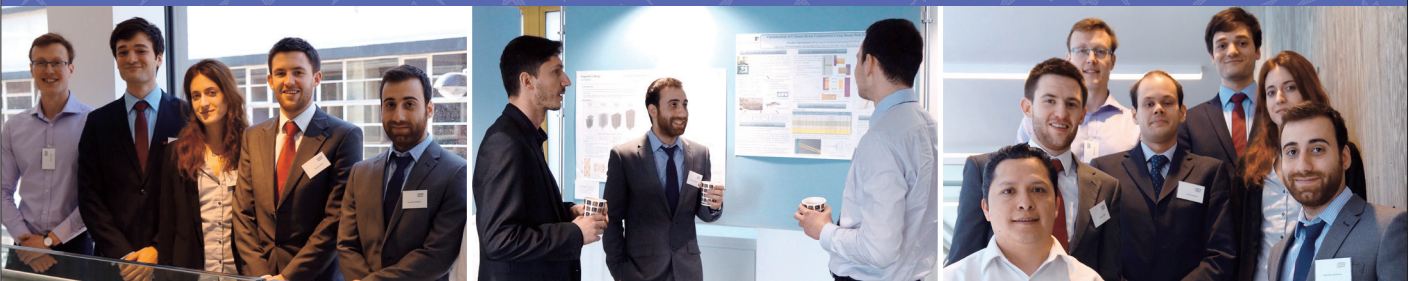
On the Safety of the European Stability Design Rules for Steel Members

Luís Simões da Silva, Trayana Tankova and Lilliana Marques, ISE, University of Coimbra, Department of Civil Engineering, Portugal

<http://dx.doi.org/10.1016/j.istruc.2016.07.004>

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