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.

Structures is a collaboration between the Institution and Elsevier, publishing internationally-leading research across the full breadth of structural engineering which will benefit from wide readership by academics and practitioners.

Access to *Structures* is free to Institution members (excluding Student members) as one of their membership benefits, with access provided via the 'My account' section of the Institution website. The journal is available online at: **www.structuresjournal.org**

New issue available

A new issue of *Structures* (Volume 15, August 2018) is now available. Editor-in-Chief, Professor Leroy Gardner, has selected a paper on 'Advanced Finite Element Simulation of Ductile Structural Steel Incorporating a Crack Growth Model' as his featured article. This will be available free of charge online for the next six months.

Further highlights discuss the 'Behaviour of Single Angle Connections Under Simultaneous Shear, Tension and Moment', 'Headed Bar Connections Between Precast Concrete Elements: Design Recommendations and Practical Applications' and 'Slender Roof Structures – Failure Reviews and a Qualitative Survey of Experienced Structural Engineers'.

Improved access to *Structures*

From late October, Institution members will be able to read articles published in Structures on ScienceDirect (www.sciencedirect.com/journal/structures) – Elsevier's leading platform for scholarly research. The new arrangement will replace the current member portal (www.structuresjournal.org).

The ScienceDirect platform will provide members with an improved experience – with pages loading faster, easier navigation and mobile optimisation.

In practice, members will still access the journal in the same way: log in to your account on the Institution website, then click the 'Access Structures Journal' link. Following the switchover, the link will take you to the ScienceDirect platform as an authenticated user.

Editor-in-Chief's Featured Article

Advanced Finite Element Simulation of Ductile Structural Steel Incorporating a Crack Growth Model

M.S. Hassan, S. Salawdeh and J. Goggins
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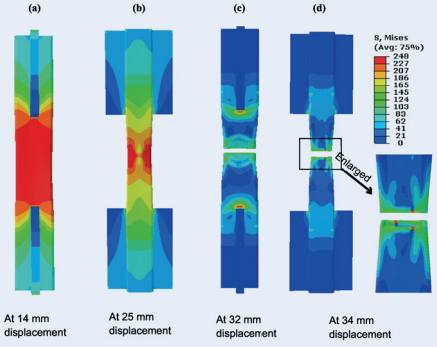
A design methodology that addresses the modelling of ductile steel behaviour in a unified format is presented. In this methodology, three empirical laws defined as Hook's Law, Hollomon Law, Modified Weighted Average Law and a crack driven law based on the extended finite element method (XFEM) are linked empirically and systematically to format an advanced design approach. A set of test data representing forty-five coupon tests of 40 × 40 × 2.5, 20 × 20 × 2.0, and 50 × 25 × 2.5 (mm) square and rectangular steel hollow sections is used to demonstrate its applicability and effectiveness in driving the material model. The material model developed is employed in a robust numerical model of the steel hollow sections. Another set of data representing twenty-three monotonic static tests of steel hollow sections is employed to validate the



XFEM model's performance. The XFEM results are found to match the physical tests values relatively well. In other words, when comparing the ratio of yield force, ultimate displacement, and energy dissipation capacity estimated from the finite element (FE) model to the measured values in the physical test, the mean values are found to be 1.03, 1.08, and 1.05 with a coefficient of variation of 0.05, 0.19, and 0.19, respectively. Hence, the design methodology presented and the XFEM model developed can be used with confidence as they have been calibrated and validated using the test data.

The full paper is available at https://doi.org/10.1016/j.istruc.2018.06.002.

Editor's Highlights

Behaviour of Single Angle Connections Under Simultaneous Shear, Tension and Moment

Hossein Daneshvar and Robert G. Driver
University of Alberta, Canada
https://doi.org/10.1016/j.istruc.2018.05.005

Headed Bar Connections Between Precast Concrete Elements: Design Recommendations and Practical Applications

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https://doi.org/10.1016/j.istruc.2018.06.008

Slender Roof Structures – Failure Reviews and a Qualitative Survey of Experienced Structural Engineers

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https://doi.org/10.1016/j.istruc.2018.06.009