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Award-winning paper in 2017.

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Announcement

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Award-winning paper in 2017

Papers published in *Structures and Buildings* are eligible for awards from the Institution of Civil Engineers. Papers from any of the ICE journals can be nominated for several awards. In addition, each journal has awards dedicated to their specific subject area.

On Monday 8 October 2018, ICE president Professor Lord Robert Mair presented an award to the following paper published in *Structures and Buildings* in 2017.

The editorial panel nominated their best papers and an awards committee chaired by Nigel Wright allocated the awards.

Frederick Palmer Prize

The Frederick Palmer Prize, for the best paper on structures or buildings, was awarded to Lawson *et al.* (2017).

The prize was instituted by Mr John Palmer MA CEng FICE, to mark the centenary of the birth of his father, the late Sir Frederick Palmer, President 1926–1927. The prize is awarded for any paper published by the Institution irrespective of whether the paper has received any other recognition.

Abstract

The use of steel–concrete composite beams in which wide-flanged steel beams act compositely with a concrete or steel–concrete composite slab above is well established in building construction. However, for composite beams with low degrees of shear connection between the beam and slab, significant additional deflections can occur due to slip in the shear connectors. A design formula is presented for the effective stiffness of composite beams taking account of the stiffness of the shear connectors, which is compared to measured deflections of six symmetric composite beams and an 11 m span composite beam of asymmetric profile. It is shown that the comparison is good when using a shear connector stiffness of 70 kN/mm for single shear connectors and 100 kN/mm for pairs of shear connectors per slab rib. The results of push tests on a range of slab profiles confirmed these initial elastic stiffnesses. To ensure that the slip at the serviceability limit state does not lead to permanent deformations of the composite beam, it is proposed that the minimum degree of shear connection should not fall below 30% for unpropped beams and 40% for propped beams of symmetric cross-section.

Tso Kung Hsieh award

Established in memory of Dr Tso Kung Hsieh, the award is given annually to the authors of the best paper published by the Institution in the field of structural and soil vibration caused by mechanical plant, waves or seismic effects.

Abstract

This paper reports on a practical seismic-damage-control evaluation method of a high-strength steel (HSS) system comprising HSS frames with energy dissipation bays (EDBs). First, the design concept and seismic performance of the system are illustrated and verified by an experiment

Winners of the Frederick Palmer Prize, with ICE President Professor Lord Robert Mair

on a large-scale two-storey two-bay HSS frame with EDBs. Critical issues considering quantification of the seismic-damage-control threshold and the performance requirement of HSS members are clarified. A stepwise procedure that accounts for both the peak response of the HSS members and the cumulative effect of EDBs is then constructed by applying the energy balance concept and a micromechanics-based fracture model. Subsequently, the procedure is implemented on a prototype structure. The results indicate that the proposed procedure is effective for evaluating seismic performance of both HSS members and EDBs. Compared with direct application of non-linear history response analysis, which is time consuming, the proposed procedure simultaneously retains conceptual and computational advantages.

REFERENCES

- Ke K, Chen Y and Jia LJ (2017) Damage-control evaluation of high-strength steel frames with energy dissipation bays. *Proceedings of the Institution of Civil Engineers – Structures and Buildings* **170(9)**: 677–692, <https://doi.org/10.1680/jstbu.16.00098>.
- Lawson RM, Lam D, Aggelopoulos ES and Nellinger S (2017) Serviceability performance of steel–concrete composite beams. *Proceedings of the Institution of Civil Engineers – Structures and Buildings* **170(2)**: 98–114, <https://doi.org/10.1680/jstbu.16.00048>.