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Award-winning paper in 2014

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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 Friday 9 October 2015, ICE president David Balmforth presented awards to the following papers published in *Structures and Buildings* in 2014. The editorial panel nominated their best papers and an awards committee chaired by Quentin Leiper allocated the awards.

Frederick Palmer Prize

The Frederick Palmer Prize, for the best paper on structures or buildings, was awarded to Oehlers *et al*. (2014).

Abstract

Reinforced concrete members are extremely complex under loading because of localised deformations in the concrete (cracks, sliding planes) and between the reinforcement and concrete (slip). An ideal model for simulating behaviour of reinforced concrete members should incorporate both global behaviour and the localised behaviours that are seen and measured in practice; these localised behaviours directly affect the global behaviour. Most commonly used models do not directly simulate these localised behaviours that can be seen or measured in real members; instead, they overcome these limitations by using empirically or semi-empirically derived strain-based pseudo properties such as the use of effective flexural rigidities for deflection; plastic hinge lengths for strength and ductility; and energy-based approaches for both concrete softening in compression and concrete softening after tensile cracking to allow for tension stiffening. Most reinforced concrete member experimental testing is associated with deriving these pseudo properties for use in design and analysis, and this component of development is thus costly. The aim of the present research is to reduce this cost substantially. In this paper, localised material behaviours and the mechanisms they induce are described. Their incorporation into reinforced concrete member behaviour without the need for empirically derived pseudo properties is described in a companion paper.

Tso Kung Hsieh Award

The Tso Kung Hsieh Award, awarded for the best paper on structural and soil vibration, was awarded to Málaga-Chuquitaype *et al*. (2014).

Abstract

The design of prestressed concrete bridge beams usually assumes that the full capacity of the tendons can be achieved under ultimate load, based on the assumption of sufficient deformation capacity of the prestressing wires. Whether this is achieved also in older bridges is of increasing interest in remaining-life assessments since, especially in aggressive marine environments, corrosion of steel is known to cause loss of wire ductility. Results are reported herein of load tests to destruction for three full-sized and deteriorated prestressed concrete bridge beams recovered from a 45-year-old bridge exposed to an aggressive marine environment. The two beams with the greatest superficial deterioration showed progressive and premature failure of the prestressing wires. The beam with little superficial deterioration also showed progressive failure and failed to reach the ultimate load capacity based on current design theory and actual material properties. Possible reasons for the observed behaviour and the practical implications are discussed.

Christian Málaga-Chuquitaype, Andrew Lawrence and Sebastian Kaminski, winners of the Tso Kung Hsieh Award, with ICE President David Balmforth.

REFERENCES

Málaga-Chuquitaype C, Kaminski S, Elghazouli AY and Lawrence A (2014) Seismic response of timber frames with cane and mortar walls. *Proceedings of the Institution of Civil Engineers – Structures and Buildings* **167(12)**: 693–703, http://dx.doi.org/10.1680/stbu.13.00090.

Oehlers DJ, Visintin P, Chen JF and Ibell T (2014) Simulating reinforced concrete members. Part 1: partial interaction properties. *Proceedings of the Institution of Civil Engineers – Structures and Buildings* **167(11)**: 646–653, http://dx.doi.org/10.1680/stbu.13.00071.