

## Award-winning paper in 2011

### MCR Award

Every year, the editorial advisory board selects the best paper published in *Magazine of Concrete Research*. All papers published in the journal are eligible for this award.

On Friday 12 October 2012, ICE president Richard Coackley presented the award to Sagaseta *et al.* (2011).

### Abstract

Most analytical approaches and available test data for punching shear in flat slabs assume axis-symmetrical conditions, which seems realistic for representing slabs supported on columns equally spaced in both orthogonal directions. However, in practice, there are many instances where loading, geometry and reinforcement around internal columns differ significantly from ideal axis-symmetrical conditions. Typical examples include slab bridges, flat slabs with unequal spans and footings with unequal widths. This paper presents a series of punching shear tests on slabs without transverse reinforcement and different flexural reinforcement ratios or loading conditions in each orthogonal direction. The tests show that both the type of loading and the amount of flexural reinforcement have a significant influence on the punching shear strength and symmetry of the response. Eurocode 2 and BS 8110 code formulas provided reasonable strength predictions of the tests using the recommended average reinforcement ratio between the  $x$  and  $y$  directions. A physical explanation behind this assumption is presented, based on critical shear crack theory. A rational analytical approach was developed for non-axis-symmetrical punching, which provides accurate predictions of strength and deformation capacity. The novelty of the proposed method is that it considers a non-uniform shear strength distribution per unit length along the control perimeter, which results in a redistribution of shear near failure.

### REFERENCE

Sagaseta J, Muttoni A, Fernández Ruiz M and Tassinari L (2011) Non-axis-symmetrical punching shear around internal columns of RC slabs without transverse reinforcement. *Magazine of Concrete Research* **63(6)**: 441–457, <http://dx.doi.org/10.1680/mac.10.00098>.



ICE President Richard Coackley presents the MCR Award to Juan Sagaseta