

# 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.

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## Impact statements

In this issue, we launch a new feature for *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.

We begin with a paper discussing the partial safety factor for reinforcement (published in Volume 5). The paper had its origins in work carried out by the late Professor Andrew Beeby. Sadly, Professor Beeby died before the paper was complete. Author Paul Jackson explains:

“I agreed to complete the paper. I anticipated this being minor editing but found that a change in the BS for reinforcement had not been considered. This required redoing the analysis but made the case stronger.

“Many members will remember Professor Beeby with both affection and great respect. For me, it is an honour to be joint author of the last Andrew Beeby paper and I only hope the parts I had to change are as good as the original.”

## Partial safety factor for reinforcement

*Andrew Beeby and Paul Jackson*

In 1989 the partial safety factor for reinforcement in BS 8110 was reduced from 1.15 to 1.05. The justification for this using both reliability theory and experience was covered in a paper by Andrew Beeby which provoked extensive discussion. Since then, the standard grade has increased to 500N/mm<sup>2</sup>. As the study justifying the previous change was for 460 grade, the factor was changed back to 1.15. It was anticipated this would be temporary until data was available for the new steel.

In this paper the safety factor for the 500 grade reinforcement is investigated using new very extensive CARES data, some 17,000 test results. It is found that the case for using

1.05 for flexural design is as strong as it was in 1989, helped by a change in the BS for reinforcement which means yield stress is calculated on nominal area so variation in actual area is no longer a factor.

Neither reliability theory nor the experience base for using it with the EN 1992 varying angle truss approach for shear is as good. The work does, however, justify using it for other cases and, where not constrained by the need for strict compliance with current codes, this could be done immediately. This would lead to a 9% saving in any flexural or direct tension reinforcement governed by ultimate strength.

The work is being discussed in the relevant BSI committee and it is estimated that full adoption of the recommendations would lead to a saving of some £7M a year in the UK.

## Volume 5

The fifth issue of *Structures* (Volume 5) is now available and features the following articles:

### Geometrically and materially nonlinear creep behaviour of reinforced concrete columns

*Ehab Hamed and Cynthia Lai*

### Seismic risk assessment of low rise RC frame structure

*A. Melani, R.K. Khare, R.P. Dhakal and J.B. Mander*

### The sensitivity of bridge safety to spatial correlation of load and resistance

*Donya Hajjalizadeh, Eugene J. O'Brien and Mark G. Stewart*

### An evaluation of EC2 rules for design of compression lap joints

*John Cairns*

### Soil–structure interaction analysis of a FPS-isolated structure using finite element model

*A. Krishnamoorthy and S. Anita*

### Concrete filled elliptical steel tubular members with large diameter-to-thickness ratio subjected to bending

*Kojiro Uenaka and Hisao Tsunokake*

### Behaviour of PVC encased reinforced concrete walls under eccentric axial loading

*Amr Abdel Havez, Noran Wahab, Adil Al-Mayah and Khaled A. Soudki*

### Compressive behaviour and design of prestressed steel elements

*Jonathan Gosaye, Leroy Gardner, M. Ahmer Wadee and Murray E. Ellen*

### Seismic performance assessment of self-centering dual systems with different configurations

*Mehdei Kafaeikivi, David A. Roke and Qindan Huang*

### Partial safety factor for reinforcement

*Andrew Beeby and Paul Jackson*

### Performance-based Seismic Design of an Irregular Tall Building – A Case Study

*Ali Ruzi Özyugur*

### Effect of stay-in-place PVC formwork panel geometry on flexural behavior of reinforced concrete walls

*Benjamin Scott, Noran Wahab, Adil Al-Mayah and Khaled A. Soudki*

### Effect of concrete compressive strength on transfer length

*Alberto T. Ramirez-Garcia, Royce W. Floyd, W. Micah Hale and J.R. Marti-Vargas*

**Behavior of GFRP bridge deck panels infilled with polyurethane foam under various environmental exposure**

*Hesham Tuwair, Jeffery Volz, Mohamed ElGawady, Mohamed Mohamed, K. Chandrashekhara and Victor Birman*

**On the improvement of buckling of pretwisted universal steel columns**

*Farid H. Abed, Mai Megahed and Abdulla Al-Rahmani*

**Application of Intelligent Passive Devices Based on Shape Memory Alloys in Seismic Control of Structures**

*Behrouz Asgarian, Neda Salari and Behnam Saadati*

**Buckling and Vibration of Functionally Graded Material Columns Sharing Duncan's Mode Shape, and New Cases**

*Isaac Elishakoff, Moshe Eisenberger and Axel Delmas*

**An experimental study on the effect of PET fibers on the behavior of exterior RC beam-column connection subjected to reversed cyclic loading**

*Comingstarful Marthong and Shembiang Marthong*

**Bond behavior of smooth and sand-coated shape memory alloy (SMA) rebar in concrete**

*A.H.M. Muntasir Billah and M. Shahria Alam*

**Lateral Cyclic Behaviour of RC Columns Confined With Carbon Fibres**

*Pedro Faustino, Pedro Frade and Carlos Chastre*

**Analytical approach of anchor rod stiffness and steel base plate calculation under tension**

*Konstantinos Daniel Tsavdaridis, Mohamed A. Shaheen, Charalampos Baniotopoulos and Emad Salem*

**Response sensitivity analyses of skewed bridges with and without**

**considering soil-structure interaction**  
*Abdoul R. Ghotbi*

**Identification of mass-spring-damper model of walking humans**

*Erfan Shahabpoor, Aleksandar Pavic, Vitomir Racic*

**Longitudinal shear resistance of PVA-ECC composite slabs**

*Bashar S. Mohammed, Muhammad Aswin, Walden Harry Beatty and Muhammad Hafiz*

**Probabilistic Seismic Assessment of RC Bridges: Part I – Uncertainty Models**

*Ricardo Monteiro, Raimundo Delgado and Rui Pinho*

**Probabilistic Seismic Assessment of RC Bridges: Part II – Nonlinear Demand Prediction**

*Ricardo Monteiro, Raimundo Delgado and Rui Pinho*

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Papers are accepted from, but not limited to, the following subject areas:

- materials
- structural form
- structural design
- construction engineering
- structural innovation
- extreme events
- sustainability
- architectural topics (that impact structural performance)

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