Structures and Buildings
Volume 167 Issue SB5

Editorial
Cotton

ice | proceedings

Proceedings of the Institution of Civil Engineers
Structures and Buildings 167 May 2014 Issue SB5
Pages 263–264 http://dx.doi.org/10.1680/stbu.2014.167.5.263

ice
Institution of Civil Engineers
publishing

Editorial

Dave Cotton MEng (Hons) CEng MICE
Associate Engineer, Atkins, Epsom, UK

It seems to me that when I was at university the impending Eurocodes barely achieved a passing whisper in lectures or tutorials. Eighteen years later, substantial achievements have been made with the final set of ten structural Eurocode documents (Eurocodes 0 to 9) published in 2010, covering the design of all structural forms in all types of material in far greater detail and across a much wider range of structural types than any set of national standards.

However, there is still much to be done. In the first paper of this issue of *Structures and Buildings*, Nethercot (2014) reflects, through many years of personal experience, on the original goals of the structural Eurocodes project, their subsequent development, progress and challenges in their adoption, the benefits of adoption, and the challenges and opportunities that lie ahead. There are many interesting insights into the somewhat lengthy (taking almost 40 years) and difficult process through which the Eurocodes have evolved, alongside the caution that hindsight makes experts of us all. Nonetheless, there is also the reminder that the structural engineering community utilises far more in terms of guidance and support material than just the codes. While much progress has been made in this area, more is required, including further development of supporting code-related material as well as support to the updating and maintenance of the codes themselves.

Codes of practice must never stagnate and will always be subject to review and update. It is also important for practicing engineers to know and understand the limitations and conservatisms contained within design code provisions. With this in mind, three papers in this issue of the journal review structural design code provisions for reinforced concrete design.

Forth *et al.* (2014) present an attempt to theoretically and experimentally verify the shrinkage curvature models presented in Eurocode 2 (EC2) (BSI, 2004) and BS 8110 (BSI, 1985). In the theoretical model the effect of shrinkage, creep and the variation in the neutral axis position of the section are taken into account and the current code predictions for shrinkage curvature of cracked sections of beams subject to bending are verified, albeit fortuitously. When coupled with finite element analysis the proposed model is shown to accurately predict the mean shrinkage curvature for the reinforced concrete beams tested under a four-point bending load. However, the theoretical and experimental results also demonstrate that the models presented in EC2 and BS 8110 can overestimate the mean shrinkage curvature for fully cracked beams.

Jain and Singh (2014) build on previously published work (Jain and Singh, 2013) investigating the use of steel fibres as minimum shear reinforcement in reinforced concrete beams. In particular, an appraisal is made of the ACI 318R (ACI, 2008) building code provisions. The authors conclude not only that the deformed steel fibres tested are suitable as minimum shear reinforcement in reinforced concrete beams with depth equal to those tested, but also that the longer (60 mm) hooked-end steel fibres may be used at a volume fraction less than the ACI 318R code recommended lower bound. Comparison of experimental results is made with seven shear strength models considered from the literature. It is also suggested that a fresh look may be required to the ACI 318R flexural performance criteria for examining the suitability of steel fibres proposed for use as minimum shear reinforcement.

The third paper reviewing structural design code provisions for reinforced concrete design, presented by Lee *et al.* (2014), provides experimental data on the performance of large-scale reinforced concrete columns under axial compression loads. In particular, the effects of different methods of engaging cross-ties with perimeter hoops and longitudinal bars are examined. Code provisions within ACI 318M (ACI, 2011) requiring consecutive crossties engaging with longitudinal reinforcement to be alternated end-for-end are also investigated for their effectiveness, with interesting results which challenge the significance of this requirement. Tests were carried out under monotonic axial compression loads, and the authors acknowledge that the effectiveness of the crosstie and hoop schemes under cyclic loading requires further study.

The internet, with its ever-increasing speed and power, continues to offer great opportunities to improve the way we do things as structural engineers. I wonder whether we, as an industry, are behind other industries in embracing such opportunities. The final paper in the issue presents one such opportunity. A free web application Midas (Modal Identification of Deformable Systems) is presented by Cury and Barbosa (2014) and applied to structural modal identification. The high computational costs often associated with modal identification processes, coupled with the increasing expansion of high-speed broadband internet, mean the concept of web applications appears an attractive and powerful tool. The authors present both the concept of web applications and the Midas application itself, and then apply the tool to two bridges to demonstrate its potential. The brief examples presented show the potential of the Midas application, with comparative modal parameter results to those identified in the cited references, and faster processing times than its counterpart.

I hope you find these papers both stimulating and informative. Please also remember that the journal publishes its most recent articles Ahead of Print on its Virtual Library homepage (http://www.icevirtuallibrary.com/content/serial/stbu/fasttrack).

REFERENCES

ACI (American Concrete Institute) (2008) ACI 318R-08: Building code requirements for structural concrete and commentary. ACI, Farmington Hills, MI, USA.

ACI (2011) ACI 318M-11: Building code requirements for structural concrete and commentary. ACI, Farmington Hills, MI, USA.

BSI (1985) BS 8110-2: 1985: Structural use of concrete. Part 2: Code of practice for special circumstances. BSI, London, UK.

BSI (2004) BS EN 1992-1-1: 2004: Eurocode 2: Design of concrete structures. Part 1-1: General rules and rules for buildings, BSI, London, UK.

Cury A and Barbosa F (2014) A web application system for structural modal identification. *Proceedings of the Institution of Civil Engineers – Structures and Buildings* **167(5)**: 312–324, http://dx.doi.org/10.1680/stbu.12.00020.

Forth JP, Mu R, Scott RH, Jones AEK and Beeby AW (2014) Verification of cracked section shrinkage curvature models. *Proceedings of the Institution of Civil Engineers – Structures and Buildings* **167(5)**: 274–284, http://dx.doi.org/10.1680/stbu.12.00046.

Jain K and Singh B (2013) Steel fibres as minimum shear reinforcement in reinforced concrete beams. *Magazine of Concrete Research* **65(7)**: 430–440, http://http://dx.doi.org/10.1680/macr.12.00113.

Jain K and Singh B (2014) Investigation of steel fibres as minimum shear reinforcement. *Proceedings of the Institution of Civil Engineers – Structures and Buildings* **167(5)**: 285–299, http://dx.doi.org/10.1680/stbu.12.00071.

Lee T-K, Chen C-C, Hwa K and Pan ADE (2014) Performance of large reinforced concrete columns under axial compression loads. *Proceedings of the Institution of Civil Engineers – Structures and Buildings* **167(5)**: 300–311, http://dx.doi.org/10.1680/stbu.12.00011.

Nethercot DA (2014) Developing and adopting the structural Eurocodes. *Proceedings of the Institution of Civil Engineers – Structures and Buildings* **167(5)**: 265–273, http://dx.doi.org/10.1680/stbu.12.00025.