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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Structures prizes announced

This month we are delighted to announce the winners of the 2018 *Structures* prizes. Congratulations to Andrew Liew, Leroy Gardner and Philippe Block on winning the 'Best Research Paper Prize' for their paper on 'Moment-Curvature-Thrust Relationships for Beam-Columns' published in Volume 11, August 2017.

We also congratulate Chris Burgoyne and Owen Mitchell on winning the 'Best Research into Practice Paper Prize' for their paper on 'Prestressing in Coventry Cathedral' published in Volume 11, August 2017.

Both papers will be free to read until 7 September 2018.

The annual *Structures* prizes are judged by The Institution of Structural Engineers Research Panel and supported by Elsevier. Each prize carries an award of £500.

Best Research Paper

Moment-Curvature-Thrust Relationships for Beam-Columns

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Moment–curvature–thrust relationships (M–κ–N) are a useful resource for the solution of a variety of inelastic and geometrically non-linear structural problems involving elements under combined axial load and bending. A numerical discretised cross-section method is used in this research to generate such relationships for I-sections, rectangular box-sections and circular or elliptical hollow sections. Moment–curvature–thrust curves are derived from axial force and bending moment interaction curves by pairing the curvatures and moments for a given axial load level. These moment–curvature–thrust curves can be transformed into various formats to solve a variety of structural problems. The gradient of the curves is used to find the materially and geometrically non-linear solution of an example beam-column, by solving numerically the moment–curvature ordinary differential equations.

The full paper is available at https://doi.org/10.1016/j.istruc.2017.05.005.

Best Research into Practice Paper

Prestressing in Coventry Cathedral

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Coventry Cathedral was completed in the early 1960s and has some prestressed concrete elements to resist lateral thrust from the roof. Other prestressed structures of a similar age have had corrosion problems and this has drawn attention to the fact that there is little publicly available information about the structural system at Coventry. This paper addresses that issue and is in three sections. The first summarises the four different prestressing systems in the Cathedral and estimates the amount of prestress and its purpose in each location. Although there is no evidence of corrosion in the building at the moment, it is impossible to inspect the existing tendons, so the second section considers what might happen to the structure if corrosion of the tendons were to occur. It is concluded that very little warning of failure would be given, which would be especially important for the tendons over the baptistry window and those in the nave ties. The final section considers what could be monitored to give as much warning as possible about future problems. The effects of loss of an individual tendon, which would not by itself be sufficient to cause failure of the structure, would cause only very small strains that would be difficult to distinguish from the background strains caused by temperature change. Many of the principles discussed in the second and third sections would be applicable to many other prestressed concrete structures.

The full paper is available at https://doi.org/10.1016/j.istruc.2017.04.003.