

## Rheological Properties of Self-Compacting Concrete with 3-Dimensional Fibres

**J. Ramli\***, B. Nagaratnam, K. Poologanathan, W. M. Cheung, T. Suntharalingam, A. Richardson

Department of Mechanical and Construction Engineering  
Northumbria University, Newcastle upon Tyne, NE1 8ST, UK

Jeffri.Ramli@northumbria.ac.uk (\*corresponding author); Brabha.Nagaratnam@northumbria.ac.uk;  
Keerthan.Poologanathan@northumbria.ac.uk; Wai.M.Cheung@northumbria.ac.uk  
Thadshajini.Suntharalingham@northumbria.ac.uk; Alan.Richardson@northumbria.ac.uk

**Abstract** – This study investigates the effect of 3-dimensional (3D) fibres on the rheological properties of self-compacting concrete (SCC) using three different fibre volume fractions (1%, 2% and 3%). Two different sizes of 3D fibres with perimeters of 115 mm and 220 mm were considered. Rheological properties were determined through slump flow, J-ring, V-funnel and sieve segregation tests. The test results reveal that the addition of 3D fibres decreases the workability of the SCC. 3D fibres with a perimeter of 220 mm have a more adverse effect on the rheological properties of SCC than 3D fibres with a perimeter 115 mm. The balling effect occurred when 2% and 3% fibre volume fractions of 3D fibres with a perimeter of 220 mm were added to the mixture, compromising the workability of SCC.

**Keywords:** Self-compacting concrete, 3-dimensional fibres, Rheological properties, Workability.