

## Influence of Yield Stress and Compressive Strength on Direct Shear Behaviour of Steel Fibre-Reinforced Concrete

**Authors :** Bensaid Boulekbache, Mostefa Hamrat, Mohamed Chemrouk, Sofiane Amziane

**Abstract :** This study aims in examining the influence of the paste yield stress and compressive strength on the behaviour of fibre-reinforced concrete (FRC) versus direct shear. The parameters studied are the steel fibre contents, the aspect ratio of fibres and the concrete strength. Prismatic specimens of dimensions 10x10x35cm made of concrete of various yield stress reinforced with steel fibres hooked at the ends with three fibre volume fractions (i.e. 0, 0.5, and 1%) and two aspects ratio (65 and 80) were tested to direct shear. Three types of concretes with various compressive strength and yield stress were tested, an ordinary concrete (OC), a self-compacting concrete (SCC) and a high strength concrete (HSC). The concrete strengths investigated include 30 MPa for OC, 60 MPa for SCC and 80 MPa for HSC. The results show that the shear strength and ductility are affected and have been improved very significantly by the fibre contents, fibre aspect ratio and concrete strength. As the compressive strength and the volume fraction of fibres increase, the shear strength increases. However, yield stress of concrete has an important influence on the orientation and distribution of the fibres in the matrix. The ductility was much higher for ordinary and self-compacting concretes (concrete with good workability). The ductility in direct shear depends on the fibre orientation and is significantly improved when the fibres are perpendicular to the shear plane. On the contrary, for concrete with poor workability, an inadequate distribution and orientation of fibres occurred, leading to a weak contribution of the fibres to the direct shear behaviour.

**Keywords :** concrete, fibre, direct shear, yield stress, orientation, strength

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