

**Static behaviour of Reinforced UHPFRC beams with thin cover depth**

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Structural elements, beams  
Thin cover, steel reinforcement

October 15, 2018

**Abstract**

Because of its high tensile strength and deformation capacity, UHPFRC (Ultra High Performance Fiber Reinforced Cementitious composite) can theoretically be used without any reinforcement bars or prestressing. However, for more economical design and for reasons of structural robustness, steel rebars should complement the UHPFRC leading to R-UHPFRC (Reinforced UHPFRC) structural elements. This paper focuses on the quasi-static behavior of UHPFRC beams reinforced with single steel rebar. The beams are full-scale elements (2 meters span, 0.4 meter height) inspired by a recently built R-UHPFRC railway bridge in Switzerland. They were pre-fabricated using one-way casting and external vibrations, to provide similar conditions as in mass production. The members are tested under quasi-static loading in four-point bending. Reinforcement cover thickness is only half of the bar diameter. Two bar diameters are tested (20mm and 34mm). Results are compared with numerical modeling based on UHPFRC mechanical properties as obtained from standardized material tests on small specimens. Differences between the mechanical properties determined from small specimens and in-situ material, as well as their influence on structural performance are discussed.