**Punching Shear Behavior of UHPC Flat Slabs**

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**1 Introduction**

Flat slabs exhibit high stresses at the slab-column connection and most likely fail due to punching shear

rather than flexural failure especially when a high reinforcement ratio is used. Punching shear failure is

characterized by crushing of concrete in the column periphery before the steel reinforcement reaches the

yield strain. This type of failure is not desired for structural engineering systems, due to brittle behavior of

concrete. In this study, the behavior of UHPC slabs under punching load was investigated through experimental work. Focus of this investigation is on the interior slab-column connection.

**2 Experimental Program**

The experimental work in this study was conducted in the Structural and Materials Laboratories - Institute of Structural Engineering at the University of Kassel. The design of the experimental work can be described as follows:

A total of seven slabs were investigated: six UHPC slabs and one normal strength concrete slab. The influence of steel fiber content on the shear strength was studied on three slabs (G1Ufib0, G1Ufib0.5 and

G1Ufib1.1). The concrete compressive strength was studied on two slabs (G1Ufib0 and G2Nfc40). The effect of tension reinforcement ratio was studied on two slabs (G1Ufib0.5 and G3Uϱ1%). The size effect was investigated by comparison of two slabs (G1Ufib0.5 and G4Ut55), and finally the influence of the yield stress of tension reinforcement was studied on two slabs (G1Ufib0.5 and G5Ufy560). The characteristics of the

tested slabs are summarized in Table 1.

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