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学术论文

钢筋超高性能混合纤维混凝土梁力学性能试验研究

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摘要：

超高性能纤维混凝土具有高强度（抗压、抗拉）、高延性和高耐久性的优势，但其抗拉强度仍远低于抗压强度。将端钩型和哑铃型钢纤维按不同比例混合，采取自密实成型和常温标准养护方法，试验研究了配置440MPa纵向钢筋的超高性能纤维混凝土梁。通过12根梁的静载试验，研究了钢纤维体积率为2.0%和2.5%时，不同纤维混合比例的钢筋超高性能纤维混凝土梁的力学性能。试验结果表明：加入钢纤维后梁的极限荷载和延性显著提高；在纤维体积率2.0%时，钢筋超高性能纤维混凝土梁比配筋相同的钢筋混凝土梁承载力提高20%~41%，延性系数提高3.9~6.7倍。钢筋端钩纤维混凝土梁的承载力和延性较钢筋混凝土梁分别提高39%和5.1倍，钢筋哑铃纤维混凝土梁的承载力和延性分别提高20%和3.9倍；钢筋混合纤维混凝土梁的承载力介于钢筋端钩和钢筋哑铃纤维混凝土梁之间。参照现行规范提出了钢筋超高性能纤维混凝土梁正截面极限弯矩的计算方法，计算结果与试验结果吻合较好。 图11表6参17

关键词： 超高性能纤维混凝土梁 混杂纤维 静力试验 受弯承载力 延性

Experimental study on ultra-high performance concrete beamsreinforced with steel bar and hybrid-fiber

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Abstract:

Ultra-high performance fiber reinforced concrete (UHPFRC) has the advantages in high strength (compressive and tensile strength), good ductility and durability, however, its tensile strength is still far below the compressive strength. End-hooked and end-flatted fibers were used in this study to produce hybrid-fiber UHPFRC beams reinforced with tensile steel bar of 440MPa. The beams were casted with self-compacting UHPFRC and cured in normal temperature. The mechanical performances of 12 UHPFRC beams reinforced with tensile steel bars and hybrid-fiber were tested, where the fiber volume ratio were selected at 2.0% and 2.5%. The testing results show that the bearing capability and ductility of UHPFRC beams reinforced with tensile steel bars are significantly improved. At the fiber volume ratio of 2.0%, the bearing capacities of UHPFRC beams reinforced with tensile steel bars are increased 20% ~41%, the ductility factors are increased 3.9~6.7 times，which are compared with the beams with same renforcement bars and concrete. Compared with conventional reinforced concrete beam, the bearing capacity and ductility of UHPFRC beams with end-hooked fibers are increased 39% and 5.1 times, respecitively. The bearing capacity and ductility of UHPFRC beams with end-flatted fibers are increased 20% and 3.9 times, respecitively. And the bearing capacity of hybrid-fiber beams are in the middle between the end-hooked fiber beams and end-flatted fiber beams. The calculating methods of the bearing capacities of hybrid-fiber UHPFRC beams reinforced with tensile steel bars are suggested according to the active codes. The calculating results correspond well with the experimental data. 17Refs.In Chinese.

Keywords: ultra-high performance fiber reinforced concrete beam hybrid-fiber static test flexural bearing capacity ductility

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