

Impact of Rebar-Reinforcement on Flexural Response of Shear-Critical Ultrahigh-Performance Concrete Beams

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Abstract : In the present work, the structural responses of 12 ultrahigh-performance concrete (UHPC) beams to four-point loading conditions were experimentally and analytically studied. The inclusion of a fibrous system in the UHPC material increased its compressive and flexural strengths by 31.5% and 237.8%, respectively. Based on the analysis of the load-deflection curves of UHPC beams, it was found that UHPC beams with a low reinforcement ratio are prone to sudden brittle failure. This failure behavior was changed, however, to a ductile one in beams with medium to high ratios. The implication is that improving UHPC beam tensile reinforcement could result in a higher level of safety. More reinforcement bars also enabled the load-deflection behavior to be improved, particularly after yielding.

Keywords : ultrahigh-performance concrete, moment capacity, RC beams, hybrid fiber, ductility

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