

7. Structural Performance of Precast Concrete Beam-Column Joint Using Ultra High Strength Steel Fiber Reinforced Concrete in the Panel Zone

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To evaluate the structural performance of a precast concrete beam–column joint using ultra-high-strength fiber-reinforced concrete in the panel zone, a series of structural experiments was conducted by using three cross-shaped precast concrete joint specimens with different steel fiber contents. In the experiments, crack growth in the panel zone was reduced by reinforcing the ultra-high-strength concrete in the panel zone with steel fibers. This indicates that the decrease in strength after the maximum strength is reached can be reduced and deformation capacity (ductility) can be improved. The experiments also showed that residual crack width, too, can be reduced. Because panel zone damage was reduced, the maximum strength of the reinforced specimen was about 5 percent higher than that of a non-reinforced specimen. The use of steel fibers for reinforcement is advantageous from the viewpoint of design because it makes earthquake-induced cracks easier to repair and improves the maximum strength.

Key words: precast concrete, beam-column joint, ultra-high-strength concrete, steel fiber reinforcement, structural performance