Behavior of Composite Reinforced Concrete T-Beams having Different Combinations of Headed and Unheaded Shear Studs Embedded in tensioned Concrete Zone

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Abstract

Four simply supported composite reinforced concrete T-beams of webs partially cast in steel channels were manufactured and loaded till failure in the laboratory by four-point loading condition simulating approximately the control 7-m uniformly distributed load, to determine their load midzspan deflection and load-relative interface end slip relationships. Three of those beams were provided with effectively spaced headed studs. The main variables are the elimination of the heads of the studs shear connectors and the locations of such head- less studs. While the studs of the first of those three beams were all provided by enlarged heads, the heads of all studs of the second beam are removed. The remaining beam included exterior abundant headed studs and interior distant studs without heads. Additional digital- interpreted results evaluating parameters representing the flexural behavior and the "Integrity characteristics" of such beams were also determined to investigate the effects of such uses and distributions of unheaded studs on those two main characters of composite beams.

The present study showed that heads of the exterior abundant stud shear connectors have vital effect on the flexural stiffness and slight effects on the flexural resistance and ductility, and the relative end slip at interfaces. The study also verified that the heads of the interior distantly-spaced stud shear connectors have major positive effects on the ultimate deflection and the flexural stiffness