Phenomenological interpretation of the shear behavior of reinforced Engineered Cementitious Composite beams

This paper describes an experimental investigation of the shear behavior of beams consisting of steel Reinforced Engineered Cementitious Composites (R/ECC). This study investigates and quantifies the effect of ECC's strain hardening and multiple cracking behavior on the shear capacity of beams loaded in shear. The experimental program consists of R/ECC beams with short (8 mm) randomly distributed Polyvinyl Alcohol (PVA) fiber and conventional Reinforced Concrete (R/C) counterparts for comparison with varying shear reinforcement arrangements. Beams were loaded until failure while a Digital Image Correlation (DIC) measurement technique was used to measure surface displacements and crack formation. The shear crack mechanisms of R/ECC are described in detail based on findings of DIC measurements and can be characterized by an opening and sliding of the cracks. Multiple micro-cracks developed in a diagonal arrangement between the load and support points due to the strain-hardening response of ECC in tension. The strain-hardening response strongly influenced the shear response of the beam specimen.

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