P40 Assessment of Direct Shear Behaviour in Normal and Ultra High Performance Concretes

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Abstract:

Direct Shear is a sudden and catastrophic failure type commonly observed in reinforced concrete structures under highly impulsive dynamic loads, that can lead to sudden and catastrophic structural failure. The direct shear behavior of normal strength concrete (NSC) under both static and impact loading conditions is not well defined. Furthermore, new ultra-high performance concretes are being developed that have yet to be tested in direct shear. UHPC mixes entitled COR-TUF have been developed by the U.S. Army Engineer Research Center and Development Center (ERDC). One of the mixes developed contains steel fibers (COR-TUF1) and the other does not (COR-TUF2). As with any new material, it is important to fully characterize its properties. The purpose of the study presented in this paper was to conduct quasi-static and dynamic testing of both NSC and UHPC shear push-off specimens with varying reinforcement ratios. Preliminary results from testing were compared to the Hawkins shear transfer model to assess its suitability for predicting direct shear behavior of NSC and COR-TUF. The findings indicated that the model required modifications to adequately represent the behavior of NSC and COR-TUF specimens. Consequently, the model was modified with new coefficients for three types of concrete studied. This paper presents the study, the findings and provides conclusions.

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