

An Evaluation of Full-Scale Reinforced Concrete and Steel Girder Composite Members Using High Volume Fly-Ash

Authors : Sung-Won Yoo, Chul-Hyeon Kang, Kyoung-Tae Park, Hae-Sik Woo

Abstract : Numerous studies were dedicated on the High Volume Fly-Ash (HVFA) concrete using high volume fly ash. The material properties of HVFA concrete have been the primordial topics of early studies, and interest shifted gradually toward the structural behavior of HVFA concrete such as elasticity modulus, stress-strain relationship, and structural behavior. However, structural studies consider small-scale members limited to the scope of reinforced concrete only. Therefore, in this paper, on the basis of recent studies on the structural behavior, 2 full-scale test members were manufactured with 7.5 m span length, fly ash replacement ratio of 50 % and concrete compressive strength of 50 MPa in order to evaluate the practicability of HVFA to real structures. In addition, 2 steel composite test members were also manufactured with span length of 3 m and using the same HVFA concrete for the same purpose. The test results of full-scale RC members showed that the practical use of HVFA on such structures is not hard despite small differences between test results and existing research results on the stress-strain relationship. The flexural test revealed very little difference between 50% fly ash concrete and general concrete in view of the similarity exhibited by the displacement and strain patterns. The experimental concrete shear strength being very close to that of design code, the existing design code can be applied. From the flexural test results of steel girder composite members, the composite behavior can be secured as much as that using normal concrete under the condition of sufficient arrangement of reinforcing bar.

Keywords : composite, fly ash, full-scale, high volume

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