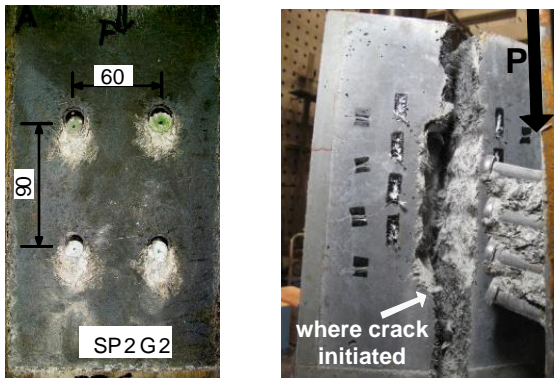


Strength Evaluation of SFRCC Slab in Headed Stud-SFRCC Composite Connection

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The strength behavior of headed stud-SFRCC slab composite connection, such as failure mode and strength are investigated based on the push-out test results. Two failure modes, stud fracture and slab splitting, were observed in the specimens as shown in Fig.1. The objective of this research is to put forward strength evaluation method for headed stud-SFRCC slab connection in the two different failure modes.



(a) Stud fracture; (b) Slab splitting.

Fig.1 Failure modes:

Parametric analyses on stud spacing and fiber volume fraction of SFRCC were conducted by finite element method to complement the physical tests. For the failure mode of stud fracture, evolution equations for a single stud and the reduction for the grouped arrangement of stud connector in shear strength was proposed; for the failure modes of slab splitting, the feasibility of an existing estimating method for slab splitting resistance was verified and some adjustments were applied to make it suitable for SFRCC slab.

Firstly, detailed finite element model was calibrated by comparing to the experimental data, and the effect of the weld collar and SFRCC material properties on strength of single stud shear is investigated by using the verified finite element model. Generalized the

analysis results, the expression of strength for a single studs are as follow.

$$P_u = A_{sc} F_u + \alpha f_c d_{wc} l_{wc}$$

When stud connectors are closely arranged in SFRCC slab, the average stud strength decreases along with the reduction of stud spacing. The strength reduction factor (as shown in Fig. 2) was generalized by parametric analyses using the calibrated FEM models.

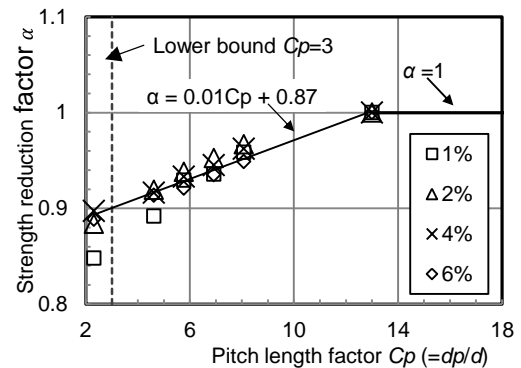


Fig.2 Effect of stud spacing on the strength reduction

Finally, a strength evaluation approach was put forward by summarizing strength estimating method for the stud fracture and slab splitting. The comparison between the evaluated and tested strength (as shown in Fig.3) proved the feasibility of the proposed evaluation methods.

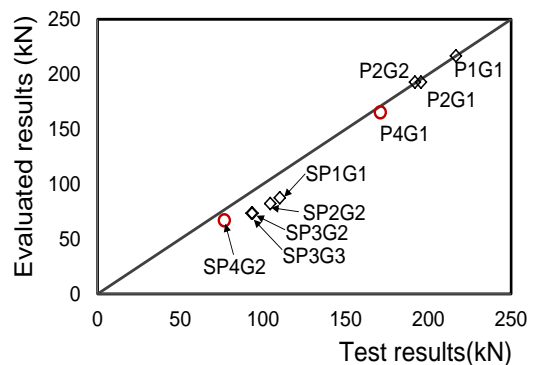


Fig.3 Comparison between evaluation and test results.