

Validation of Failure Pattern in Sample Tested in Compression to Tensile Load Convertor Device Using FRANC2D and Displacement Discontinuity methods

Abstract

In this paper, a compressive to tensile load convertor (CTC) device has been introduced which can be used for induction of tensile failure in specimen. This device was consisted of 7 different parts. Parts number 1 and 2 which have U shape and Π shape section have been made from stainless steel. Parts number 3 and 4 were made from two semi-cylindrical stainless steels with dimension of $10\text{mm} \times 75\text{mm} \times 60\text{mm}$. Parts number 5 and 6 were made from two stainless steels with dimension of $190\text{mm} \times 10\text{mm} \times 20\text{mm}$. The concrete specimens used in this test have rectangle shape with internal pore. This geometry was gained from FRANC2D simulation outputs. The concrete samples has been prepared by mixing water, fine sand and cement by the ratio of 40%, 30% and 30%. The CTC device and sample were inserted in uniaxial test machine. The tensile test was performed by conversion of compression load to tensile load using CTC test. The tensile failure pattern occurred in the sample. For validation of experimental results, numerical simulations have been done using FRANC2D and high order displacement discontinuity method. The good accordance between failure pattern in numerical simulations and experimental test shows the validation of introduced device in induction of tensile failure in specimens.

Key words: compressive to tensile converter device, tensile strength, concrete, FRANC2D, displacement discontinuity method.

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