

In this study a fracture mechanics test method is used to assess the effects of various parameters on bond strength between new and old concrete.

The test specimens are notched repaired beams with the new-to-old-concrete joints in different angles to the notches. A well-defined contact surface of hardened concrete easy to reproduce has been found. The effect of surface wetness and interface inclination on bond strength has been investigated.

The test results showed that, though no bonding agent was used, at least 70% of the loading capacity of the control solid beams could be achieved by any type of the repaired beams tested in this study under the laboratory conditions.

This observation supports confidence in the repair. The optimum wetness of the contact surface has been found to be about 2 days of drying after storing the old concrete base in water, which gave 88% of the relative flexural strength as compared to the solid beams.

The bond strength in this study is quantified in terms of the net flexural strength, and the fracture energy, G_f . From these two parameters, the tensile bond strength can be predicted by Hillerborg's fictitious crack model (FCM).

To this end, a simple closed form flexural strength function based on the FCM has been developed in this study, which makes handcalculation possible. A literature survey of fracture mechanics of concrete is also presented.