

EXPERIMENTAL INVESTIGATION AND PREDICTION OF PUNCHING SHEAR STRENGTH OF HIGH STRENGTH CONCRETE SLABS

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ABSTRACT

This research presents an experimental program for investigating punching shear strength of slabs, consisting of 27 high and normal strength concrete slabs. The test data from the experiment are analyzed and divided into three series primarily concerned with the effects of three variables on the punching strength of high-strength (HS) concrete slabs: the concrete strength, the slab depth and the column size and shape. The ACI 318-11 approach is considered along with the approaches developed by Moe, Yitzaki, Herzog, Regan, and Rankin. All approaches are compared with the experimental results.

The experimental results indicated that shear strength for HS concrete slabs is proportional to $f_c^{(n)}$ where the power (n) had been found to be in the range of (0.5 to 0.33). The assumption that the critical perimeter is at a distance (1.5d) from the load area is found to be reasonable and the reinforcement ratio has a considerable effect on the shear strength especially when the slab depth is high.

A modified approach, modelled after the Rankin's approach, is proposed and verified by this experiment and other tests.

KEYWORDS

Punching, Shear, High Strength Concrete, Slabs, and Deflection.