

## بيانات عن بحث رقم (4)

عنوان البحث:

Punching Shear Behaviour of RC Flat Plate with Openings Rested on Coupled Columns

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**Abstract** - Supporting a reinforced concrete slabs by coupled columns may cause them to behave as one column or as two separate columns according to the distance in between. In this research, the punching shear behavior of RC flat slabs with openings supported by square interior coupled columns were investigated. A total of twelve two-way RC slabs with interior two columns were constructed and tested. All the test specimens were quadratic with 1000 mm length and 65 mm thick., and have a centrally coupled square column stubs of 100 mm sides and 150 mm height. Three variables were considered in this research which is, the separation distance of the columns ( $d$ ,  $2d$ ,  $3d$ , and  $4d$ ), the location of the opening, and the distance from column face to the opening. The test results indicated that the punching shear capacity increased gradually by increasing the clear distance between columns. The experimental results showed a decrease in punching shear capacity in specimens with opening ranged between 10 % and 32% in comparison to the control specimen without opening