

Shear Strength of Reinforced Concrete Columns.

by

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SYNOPSIS

Thirty column specimens were tested with the objective of determining the carrying capacity for axial load after the shear stiffness was lessened due to repeated reversible shear loads within controlled amplitude.

Test results were analysed by means of the shear transfer theory¹.

The failure criteria of reinforced concrete columns and the effect of tie reinforcements in the ultimate states were discussed.

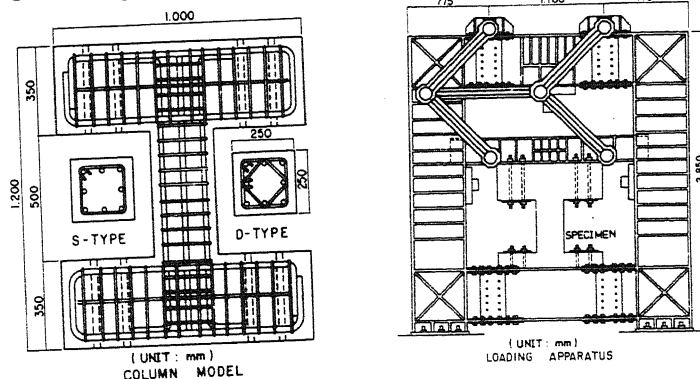
CONCLUDED REMARKS ON EXPERIMENTAL RESULTS

Thirty specimens were tested to make clear the influence of the parameters concerning tie reinforcements, axial loadings, and concrete strength in core portion to the ultimate strength. All specimens were designed to have the same conditions for following terms; sectional area (25cm X 25cm), length (50cm), and quantity of main reinforcements (8-D16mm). Repeated shear loadings were applied to specimens to give 15mm displacement as a half amplitude, until they lost the shear stiffness or failed in axial direction. This 15mm displacement is equal to 3/100 of column length, and about 2 times of maximum shear load displacement.

Test results showed that all specimens have lost the shear stiffness due to repeated loadings within 20 cycles. Among those, the specimens with axial loading over $1/3 F_c$ failed in axial direction due to the reduction of shear strength; while the specimens with axial loading less than $1/4 F_c$ kept the axial strength even after they lost the shear stiffness.

It should be noted that tie reinforcement has significant effect on strengthening of columns, but it can not always prevent the axial failure caused by repeated shear loadings.

For columns that would undergo more than 10 cycles of plastic deformations during an earthquake, for which story displacement is more than 3/100 of column length, it might be concluded that reinforced concrete columns should not be designed to be axially loaded over $1/3 F_c$, where F_c is concrete strength in cylinder test.



- 1) A.H.Mattock, et al., "Shear Transfer in Reinforced Concrete" ACI Journal, 1969 Feb., p.119 - p.128

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