BEHAVIOR OF RC BEAM-COLUMN CONNECTION WITH LARGE SIZE DEFORMED BARS UNDER CYCLIC LOADS

by

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SINOPSIS

Full size subassemblege of building frame of reinforced concrete structure with flexural reinforcement of diameter of 51 mm (D51) were tested to research the behavior of beam-column connection where high bond and shearing stress would take place under severe lateral load due to largeness of amount of reinforcement and shortness of anchoring length of the bar which was arranged to pass through the connection. Ultimate shearing strength of connection was satisfactorily predicated, and then bond stress and slip were obviously correlated.

OUTLINE OF STUDIES

Four test specimens, No.1 to NO.4 as shown in Fig.1, were provided for the experiments. The D51 bars of flexural reinforcements of beams and columns were arranged to pass through the connection. Keeping constant vertical load of 260 ton on the column, antisymmetric shear forces were alternatively loaded on the specimen. Variables were amount of flexural reinforcement in the beam, beam width, and amount and arragement of shear reinforcement in the connection. Specimen No.1 with smaller amount of reinforcement at beams failed in bending at the end of beams, and others failed in shear at the connection, while these failure mode were suggested by contribution of connection panel deformation to the overall deflection of members which was below 20% as to the former failure and above 45% as to the latter. Shearing strength(τ_p) of the connection evaluated using effective thickness difined to be the mean value of the beam and column, were .40Fc, .45Fc, .44Fc and .43Fc, No.1 to No.4 specimens respectively, where Fc is compressive strength of concrete. Fig.2 shows relationship between τ_c/Fc and Fc, where $\tau_c = \tau_p - .5P_w \, {}_s\sigma_y$, P_w is shear reinforcement ratio in the connection, ${}_s\sigma_y$ is yield point of D51, and coefficient .5 is determined by analyzing test data given the prediction of ultimate shearing strength in Japan and by measuring hoop stress in these tests. Nearly at ultimate shearing strength stage, within the connection where reinforcements of beams were anchored, bond strength of the D51 bars was observed to go up to Fc/5 to Fc/3 by approximately estimating with measured strain as to all specimens, while bond slip reached a little under 1mm as to No.1 and exceeded 1mm as to ochers failing in shear at the connection.

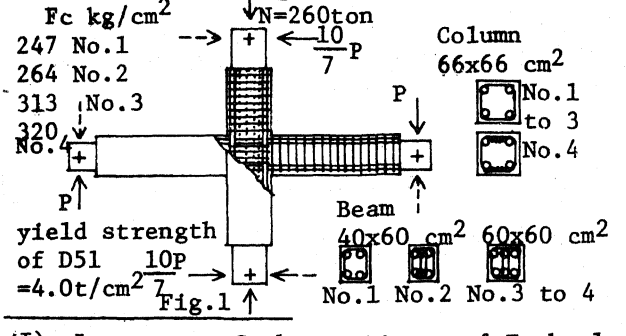

Fig.1

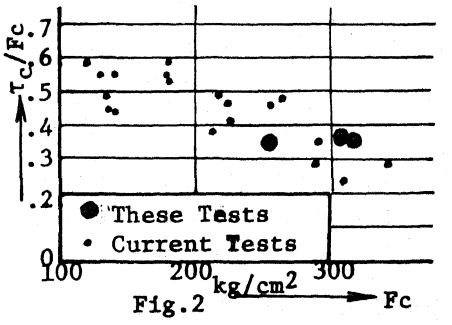

Fig.2

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