S Y N O P S I S

The problem of ultimate strength of R.C. members, failing in shear under transverse loads, has engaged the attention of investigators and many reports on the topic have been published during the last several decades. However, very few investigations on strength of reinforced concrete members, subjected to combined action of bending moment, shear and axial forces have been reported.

In this thesis, results of tests of reinforced concrete beams without web reinforcement, subjected to two-point and uniform transverse loads along with axial compression, are reported. It is shown that failure of a beam in shear involves two distinct stages; the first stage is the formation of diagonal crack from the level of longitudinal steel to the mid-depth and the second stage involves the sudden failure of the compression zone at the tip of the crack. Diagonal crack follows the path of principal compressive stress trajectory. The final failure is attributed to the combined action of normal and shear stresses, prevailing in the compression zone at the time of failure.

Analytical expressions have been developed for determining ultimate strength of reinforced concrete members, without web reinforcement, subjected to transverse and axial loads, based on

the above concept of failure. Results of the tests, carried out by the author, along with the results of previous investigators, have been verified with the theory proposed and are found to be in excellent agreement.

Thirty-two beams were tested to destruction under this investigation. They were broadly arranged under two groups :-

(a) beams subjected to two-point loads and axial compression ;

(b) beams subjected to uniformly distributed load and axial compression.

The main variables considered in the test programme were, - shear span, percentage of tensile reinforcement, axial compression and unintentional difference in concrete strength. The behaviour of beams under different stages of loading and final mode of failure are described in details.

The theory proposed is not meant to lay down a theoretical solution to the problem of shear. It, nevertheless, follows a rational approach, aided by certain assumptions, which are, however, individually and in their respective places, justified through logical or experimental evidence.

Lastly, a summary of conclusions has been drawn up.