

SYNOPSIS.

The results of experimental and analytical studies on the redistribution of moments in rectangular prestressed concrete continuous beams of two and three spans loaded to failure with different arrangements of concentrated loads on the spans are presented in this thesis. In all 50 beams of various categories were tested. The details are as under:

1. Three span beams
  - a) loaded at the middle of the central span .. 25 nos.
  - b) loaded in the end spans only .. 2 nos.
  
2. Two span beams
  - a) loaded symmetrically in both spans .. 8 nos.
  - b) loaded in one span only .. 4 nos.
  
3. Simply supported beams .. 11 nos.

All the beams failed in flexure; in the majority of continuous beams, the degree of redistribution attained in the tests differed significantly from those obtained by the application of Guyon's method and were in closer agreement with the values predicted by the extended procedure recently

proposed by Mallick. The basic considerations in these approaches are discussed.

The degree of redistribution of moments in an indeterminate structure essentially depends on the rotation capacity of the hinges. In Guyon's method the hinge rotations, to be used in the compatibility conditions, are deduced on the basis of a theoretical moment-rotation relationship; Mallick incorporates an extra rotation at one of the hinges to that given by Guyon's method. The magnitude of this extra rotation has been expressed empirically based on his tests on two span continuous beams.

In the present investigation an attempt has been made to assess the rotations at the hinges actually occurring during the tests by plotting the curvature distribution over the plastic lengths. It has been possible to express the measured rotations as proportions of those obtained on the basis of an appropriate moment-rotation relationship. A method for the computation of redistribution has been proposed. Agreement between the test results and the predicted theoretical values has been close.