THE ULTIMATE STRENGTH OF CONTINUOUS COMPOSITE BEAMS

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Abstract

The research described is concerned with compatibility requirements in continuous steel-concrete composite beams and with the determination of limits within which a simple plastic design method can be used.

Experiments on continuous beams were made to assess the validity of a computer programme which simulated beam behaviour. The beams tested were chosen to collapse by different modes and showed that, provided account was taken of strain-hardening and additional deformation after first crushing of the concrete, beam behaviour was simulated satisfactorily by the computation.

Simulation of behaviour in this way permitted a wide range of beam configurations to be investigated. The range considered, makes the results applicable to any British rolled-steel section and to some plate girder sections, when used in both building and bridge construction. The results are also related to beams in a frame.

From the investigation, current methods of calculation, if used for sections lying within recently proposed limits of slenderness, are seen to be satisfactory in most cases for assessing the strength of critical sections when a plastic design method is used. The case of exception to this, which concern the material strengths and the use of point loads, are likely to occur in a very small number of beam designs and even then would result in only a small reduction of strength.

Although the proposed limits of slenderness are found to be satisfactory, they significantly reduce the range of sections that can be used with rigid connection. This connection was seen to behave satisfactorily and would permit the full range of British rolled sections to be used.

In the assembly of the semi-rigid joints, use was made of high strength friction grip bolts and it was shown that further classification of faying surfaces, with respect to slip coefficient, should be made.