Shear Behaviour of Reinforced Concrete Members under Uniform Loads

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Summary

In nature, most loads act as uniformly distributed loads. However, during the last 60 years of experimental research on the shear behaviour of RC members, only a small number of tests involved beams subjected to uniform loads. Recent research on members subjected to uniform loading has shown that there is considerable difference in shear behaviour between uniformly and point loaded members. Furthermore, whether the uniformly distributed loading is applied on the tension or compression face of the member is important from the standpoint of shear design. This paper will present the results of an experimental program along with results from the literature and suggest analysis methods, which can accurately predict shear strength of RC members under uniform loads.

Keywords: shear; uniformly loaded members; strut-and-tie; footings; slabs.

1. Introduction

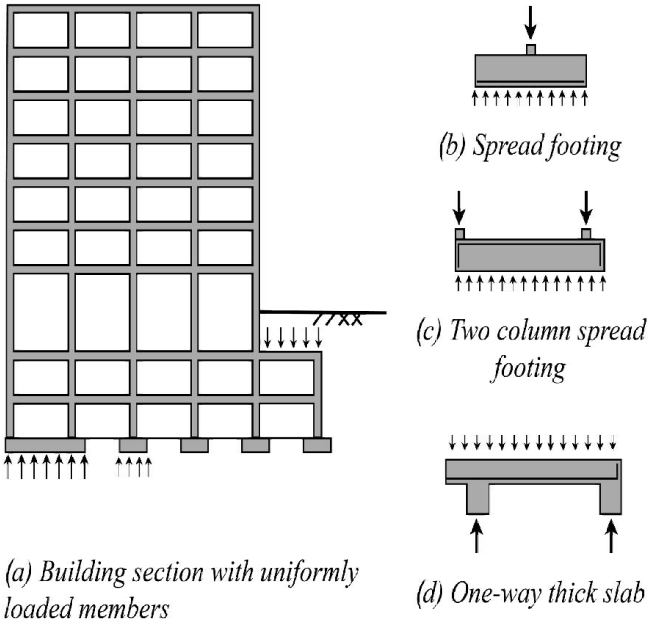

Fig. 1: Examples of uniformly loaded members

Slabs and footings such as those shown in Fig. 1 are reinforced concrete members that are generally subjected to uniformly distributed loads. In practice, it is common to construct slabs and footings without shear reinforcement and hence the safety of such important members depends upon the accuracy of the code expressions.

Tests on simply supported beams in which uniform loads are applied to the compression face of the beam (Fig. 1c and 1d), have shown that the shear strength of such members are greater than their companions under point loads [1], [2].

This paper discusses how the shear strength of reinforced concrete members under uniform loads applied to their tension face (Fig. 1b) is considerably enhanced by the beneficial nature of the loading conditions. An experimental program to study the shear behaviour of members subjected to uniform loads is described. In addition analytical models to accurately predict the strength of such members under uniform loads will be presented.

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