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SHEAR STRENGTH EQUATION IN WIDE BEAMS ACROSS THE WIDTH

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Abstract. A test programme of six reinforced concrete wide beams in two series together with their strength prediction is reported in this paper. Each series had different parameters of wide beams. In each series, specimens had identical in geometry, flexural reinforcement, amount of shear reinforcement per metre length of beam, material properties and test details. The only variable is vertical stirrup leg spacing across the beam width. The number of vertical stirrup legs in the beams across the width varied from zero to six. The shear strength of normal beams, with well distributed shear reinforcement along the length could be safely predicted by the IS: 456-2000 code. No guidance is available in any code for multiple stirrup legs across width in wide beams. Based on the experimental results, an equation was proposed to predict the shear strength of the wide beams with multiple stirrup legs. The accuracy of the proposed shear strength equation was evaluated against the experimental results; the predictions were conservative.

Keywords. Shear strength, Reinforced concrete, Wide beam, Stirrup, Deflection

1 Introduction

Beams with width to depth ratio more than one are classified as wide beams. A wide beam must have a width to depth ratio exceeding two as per Sherwood et al (2006)1.Wide members are used to carry direct forces or to serve as primary transfer elements. In modern high rise construction, a system of wide beams may provide a simple and economical system to transfer column loads from the tower portion over required column free spaces in the podium or parking areas below. In the foundations of high rise structures, water tanks, bridges and other structures wide beams find extensive application. While shear reinforcement spacing limits measured along the member length are provided in the design codes of all countries for shear design, few guidelines exist for appropriate limits on the spacing of stirrup legs across the width of the section. Adequate stirrup spacing along the span and across the width is critical. Large spacing in the longitudinal direction of the beam according to