

RESPONSE OF CONCRETE FILLED STEEL SANDWICH PLATES UNDER HARD LATERAL IMPACT

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ABSTRACT

An experimental programme was conducted to study the behaviour of steel – concrete composite sandwich plates under low velocity hard lateral impact. Initiation of the punching mode of failure was examined adopting a specially designed frame that minimized the bending of the specimen. Square 300x300 mm plates of varying thickness were used as test specimens and were subject to impact at their center. A 40-kg drop hammer under free fall, dropped from a height of 4.0 m, was used to create the impact. The drop hammer had a hemispherical head. Following the impact, for all specimens, the strains in the bottom surface of the bottom steel plate rose steadily to a peak and then dropped steadily to a residual strain level at which it remained constant thereafter. Concrete and high strength concrete middle plates cracked. Fiber reinforced composites, SIFCON [1] and ferrocement [2] helped in reducing the cracks significantly and ensured that the middle plate remained as a single piece after the impact. Fourteen different specimens have been tested, comprising of plain steel plates to sandwich plates with a variety of middle plates. Comparisons between these specimens have been made on the basis of the strains recorded in the bottom plate, the depth of the dents on the top and bottom steel plates, and the extent of cracking of the middle plate.