

INVESTIGATING THE USE OF SPACE SWIMMER BARS AS PUNCHING SHEAR REINFORCEMENT OF REINFORCED CONCRETE FLAT PLATES

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Abstract

Space Swimmer bars are a new type of punching shear reinforcement which is composed of short inclined bars welded to both top and bottom flexural reinforcement. These swimmer bars can form different shapes. In this study pyramid shape will be investigated since the punching shear takes the form of a truncated pyramid or a truncated cone. A counteract truncated pyramid or a truncated cone of reinforcement forming space three dimensional pyramid by swimmer bars will be employed to generate four inclined planes crossing the four inclined planes of the cracks. The results obtained from plates provided with these plane-crack interceptors showed substantial improvement in punching shear strength. The slope of the swimmer bars may be used to increase their capacities in the vertical direction by increasing the size of the vertical component of the slope. The number of truncated pyramid-crack interceptors may be increased for large applied punching shear forces. The use of this new concept of shear reinforcement will lead to a uniform slab thickness and the elimination the need for column crown or drop flat plate.

Keywords: Swimmer bars, concrete slabs, punching shear, flat plates, pyramid cage