A Review on Tensile Behavior of Steel Fiber Reinforced Concrete

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Abstract - *The objective of this test was to think about the behavior of concrete reinforced with steel fiber (SFRC). Strands of trapped ends and stratified strands with a ratio of 55 points were used. The samples were molded without fibers and with 0.5% and 1% fibers. Tests were carried out to study the resistance to compression, tensile, bending and energy absorption. The experimental findings indicate that the low static load test volume in each panel to calculate energy absorption, ductility index and drying stiffness were conserved for future generations. With this objective of achieving sustainable construction and a strong trend that favors the increasing use of additives in concrete, it is emerging all over the world. Mineral mixtures are essentially the waste results of modern procedures, created by a large number of tons whose transfer is an extraordinary concern.*

Key Words: *Steel Fibre Reinforced Concrete, Static load, Panels, Beams, Toughness, Tensile*

1. INTRODUCTION

Concrete, a fragile material, can fail in tension by the rapid propagation of a single defect or relatively small crack. Therefore, it is a common design practice to ignore the tensile strength of cracked concrete. It is known that concrete subjected to a uniaxial tensile behavior is qualitatively similar to the response of the concrete subjected to uniaxial tension both in tension and compression, the response consists of an elastic branch, a reduction of the rigidity after cracking and finally a softening branch posterior to the peak. However, the voltage peak is significantly less in tension and the post-peak softening branch can have a very sharp tension, which leads designers to neglect the residual tensile strength of normal concrete. The inclusion of fibers in a concrete matrix substantially improves post-peak resistance of the compound. Therefore, it is necessary to take into account the post-crack resistance of fiber reinforced concrete in the analysis for accurate predictions of deflection, crack width, adhesion transfer, and shear transfer and fiber stiffness between fiber-reinforced concrete cracks. There are several studies on the effect of fibers on the tensile strength of concrete. It is known that the inclusion of fibers in the concrete improves the tensile strength of the SFRC, but the increase in tensile strength is relatively small. On the other hand, the tensile stress support capacity posterior to the peak of the concrete is remarkably improved due to the bridging action of the fibers through the cracks. The modeling of the descending part of the tensile behavior should be useful to characterize the performance of the material as well as for designs that imply resistance to impact and tenacity. However, little research has been published on the effect of fiber addition on the descending part of the stress-strain curve. One of the reasons for the lack of such information is the difficulty in obtaining a complete tension-strain curve (crack width). This article reviews the previous work on concrete reinforced with tensioned steel fiber.

2. LITERATURE REVIEW

Farghal (2014) [1] studied the performance of fatigue in reinforced concrete T-beams (RC) reinforced in shear with polymer composite reinforced with carbon fiber (CFRP). Twelve RC-T beams were tested under a load of two points Flexion test in a simple time. Six specimens were statically tested and six other specimens were tested under repeated loading. The repeated load was inclemently applied. The maximum load applied was taken as half the load of failure and the minimum charges were constant at 14 KN. Finally, the author concluded that the different reinforcement beams survived a million cycles without apparent signs of damage, therefore demonstrating the effectiveness of the strengthening used technique on extending the fatigue life of a structural element.

Khan and others (2014) [2] researched to obtain the use of CFRP wrappers attached externally instead of strips for strengthen the RC rays in flexion with and without end anchors. Six beams were tested with different aspects relationships under the four-point bending tests. The rays are divided into two groups according to span / depth ratios. The span / depth ratio of group 1 was 3.4 and the span of group 2 / depth the relationship was 2.5. Finally the author was concluded CFRP increasing stiffness, ductility and increasing load

The load capacity of RC reinforced spokes in order anchors.

Michel et al. (2013) [3] conducted the experiment and numerical research on the resistance to subsequent cracking, Energy absorption and fracture of steel fiber reinforced concrete (SFRC). Two types of steel fibers were used in this study. The first fiber named was Type A tabix + 1, had 60 mm in length, 1 mm in diameter and appearance the ratio was 60 and another was tabix + 1.3 was 50 mm length, 1.3 mm in diameter and an aspect ratio of 39. Finally the author concluded the new numerical calculation of the experimental tests of rays and plates and, therefore, a comparison of fracture energies of SFRC elements with different sizes and geometry.

Lin et al. (2013) [4] performed to obtain fatigue behavior made of composite steel and concrete beams subject to negative bending moment. Repeated loading was used in this study and find the initial crack and the stabilized crack. Two composite beams of steel and concrete were made substructures respectively. Three simply overturned composite beams made of steel and concrete were tested under concentrated load in the middle stretch and to measure the deflection with LVDT, and strain gauges were also used to measure the tension in the steel strip, upper and lower steel flanges Finally, fatigue tests will reduce the beam rigidity in the elastic stage and final load capacity.

Makita et al. (2013) [5] studied the traction fatigue tests in R-UHPFRC elements. Ultra-high performance fiber reinforced concrete (UHPERC) was a cement Composite material, consisting of cement, quartz, sand, silica and fiber smoke. It has a high resistance to compression and high tensile strength of concrete. Simple quasi-static charge was applied in the specimens. The voltage behavior of UHPFRC was explained when analyzing the global force obtained deformation curve and also improve the load the load capacity of the bridges was shining due to the increased traffic loads for more efficient transport industrial product. Finally, it is concluded that steel reinforcing bars actually improve the load capacity of the fatigue force of UHPFRC distributing the applied fatigue effort.

Slater et al. (2012) [6] evaluated the cut resistance of the reinforced concrete beams with steel fiber (SFRC). The SFRC the beams were divided into six different groups depending on its span-depth relationship. Different types of steel fibers were found used in this study. The cut resistance was obtained perform linear and non-linear regression analysis of each database. Finally, the cutting behavior of the SFRC was wider applications in the concrete industry. Many of the researchers had developed analytical and numerical tools to predict the shear strength of the SFRC beams.

Gajalakshmi et al. (2012) [7] investigated the accumulated damage of full steel columns subjected to quasi-static loading. The two types of fillers named as Concrete reinforced with steel fiber and simple concrete. Cyclic loading was applied in both specimens. Finally the results of the test was carried out increasing the ductility, the absorption of energy capacity and decrease in the rate of damage of steel fiber Reinforced concrete columns compared to simple cement concrete column.

3. CONCLUSIONS

1) The addition of steel fiber in the concrete mix, it is found to increase tensile performance of concrete compared to plain concrete. SFRC has a slightly higher tensile strength, which later improves cracking flexibility and dramatically improves high fracture energy.

2) Pre-cracking of the concrete stress-tension reaction turns slightly in the ascending branch matrix by adding fiber. Tensile strength has increased slightly and elastic modulus increases significantly with increase in fiber content. Two straight lines can be drawn to estimate the pre-soft phase of tensional stress-stress relationship of SFRC. The first straight line begins with Genesis and it has a slope equal to the hardness / modulus of the stress-stress curve, and the second straight line passing through maximum stress is zero hardness.

3) Post-peak straight tensile stress-crack reduction slows down the width curve after the increase in fiber content, resulting in higher flexibility and cruelty of SFRC.

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