Experimental Study on the Effect of Adding Styrene Butadiene Rubber (SBR) Polymer on Hybrid Fibre Reinforced Concrete

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Submitted by

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Abstract

Fibre Reinforced concrete is a well-known composite material used in civil engineering and other applications. Conventional concrete has poor tensile strength so its capacity to absorb energy is limited. The weakness in tension zone can be overcome by strengthening their matrix with reinforcing fibrous materials. Presence of fibres in concrete mix improves tensile strength, flexural strength and structural quality of the material as well. At the same time it is well known that the concrete is porous and the porosity is due to water-voids, air-voids or due to inherent porosity of gel structures itself and the strength of the concrete is naturally reduced. It is investigated and conceived by many research workers that dropping of porosity results in improvement in the strength of concrete.

The addition of monomer (Styrene Butadiene) and consequent polymerization is the modern practice adopted to decrease the present porosity of the concrete and to improve the strength. The present study is done on the mechanical behaviour of hybrid fibre reinforced polymer concrete. Experimentation includes compression strength test, flexural strength and split tensile strength test for M30 grade concrete mix, where concrete was reinforced with 2% fibres with 3 different combinations like Crimped fibres + Hooked End steel fibres, Crimped fibres + Polypropylene fibres, Hooked end steel fibres + Polypropylene fibres. To these combinations SBR polymer was added in 0, 5, 10, 15, 20 and 25 percentages by the volume of water and strengths were found out.

The results indicated that as the polymer content increased to up to 15% showed that strength and workability also increased and decreases beyond that in all the 3 combinations. There was a considerable increase in compressive strength, but there was a great strength achievement in tensile strength and flexural strength for 15% polymer content. Crimped fibres + Polypropylene fibre combination gives more strength compared to other 2 combinations. Thus 15% of polymer is the best quantity for mechanical strength and Crimped fibres + Polypropylene fibre combination was found to be a best combination to achieve maximum strength.