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Experimental Investigation On Polymer Concrete With Different Volume Division of Bamboo Fiber

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Abstract *- This paper examines the exploratory Physical Characteristics of polymer concrete with various fractions' Bamboo fiber. From this exploratory investigation, it is discovered that the quality increment to some extent, the Split tension test result is improved because of the fiber content in the concrete the formation of crack was slowly downed, and the load-carrying capacity is higher for this polymer concrete with two percent of fiber content.*

INTRODUCTION

From previous studies, Eether Dawood et al. 2012 that the perception of combination with two or more various fibres integrated into a regular cement matrix can present added appealing engineering characteristics because one fibre gives the more impressive usage of the powerful properties for the other fibre. Steel fibre has a significantly better length and high Young's modulus of elasticity when related to other fibre-categories. This drives an enhanced flexural rigidity and a great possibility for crack control, even though it is more volumetric. It is also vital to note that steel has properties to conduct current and magnetic fields, and for this reason, the steel fiber content must be decreased to some extent. Maximization of physical and conductivity behavior can be attained by mixing various fibers, such as the natural fibre (palm, sisal, and bamboo fibre). The striking benefit of fusion fibres system is that it gives a system in which a type of fibre, which is stronger and rigid, enhances the initial crack stress and eventual strength, where another type of fibre, which is more supple and ductile, leads to the enhanced hardiness and tension capability in the post-cracking zone. It also provides a hybrid reinforcement, in which the shorter fibre connects micro-cracks and lowers the crack widths. This gives an advanced tensile property of the composite. Another type of fibre is bigger, so it can seize the extension macro cracks and considerably enhance the composite's robustness.

Moreover, most of the research work and fibre reinforcement is about a single type of fiber. Using mixed fibres as reinforcement to enhance the performance of concrete are not often reported. Therefore, the research presents the outcome of some characteristics of high strength concrete equipped with hybrid fibres. Olaoye et al. (2013) deal with using some fibres as waste solid for making eco-friendly and green environments. The natural fibre is purely bio-degradable and recyclable. In that way, it reduces pollution, endorse biodiversity and the upkeep of naturally available resources, and as a result, it is environmentally friendly. Three fibres, namely Jute, Oil palm, and Polypropylene fibres are used in concrete, and their appropriateness, lifetime, and influence on the characteristics of concrete were calculated. The % of the fiber used was 0.25 and 0.50 of cement by mass. A total of 85 polymer concrete cube samples were prepared for fresh and harden concrete tests such as slump test, compaction factor test, and compression test. The examined results showed that for fibers of jute and Oil palm fibres, the best fibre content percentage was 0.25%, and for Polypropylene fibre, the best fibre content was 0.5%. They all improve in strength compared to the common concrete specimen and have confirmed to pull down the reasonable environmental waste pollution.

Therefore an effort has been made in this experimental investigation to read the outcome of adding up steel fibre at an amount of 1.5% of the total mass of concrete as fibres. Metakaolin was used at 8% of cement mass as metakaolin, and the adding up of steel fibers at 1.5% and 8% of metakaolin. The experiment was done using an M40 mix, and tests were carried out as per the recommended procedures by relevant codes. The results were compared with control concrete; it was observed that concrete blocks incorporated with steel fiber increased their compressive strength by 8.91% and tensile strength by 26.94%. K. Ramesh et al. (2013), the present Experimental investigation is to study the Mechanical Properties of the Fly ash concrete reinforced with steel fibers. Steel fibers varied from 0%,0.5%, 1%, and 1.5% by weight of cement. Specimens were tested for 28 days, 60 days, and 90 days. Based on the experimental results, it was found that the number of steel fibers which can be added to the concrete for improving its strength characteristics maybe 1% by weight. The addition of steel fibers more than1% generally affects the Compressive strength, Split tensile strength, and Flexural strength of the concrete.

I. MATERIALS

In this project work, Grade 43 ultra tech cement, fine aggregate passes 4.75mm IS sieve, and machine crushed stone as coarse aggregate of angular shaped with 20mm & Admixture superplasticizer is taken. The mineral admixture of Flyash and is used in this concrete. The bamboo fiber of an Average fiber length of 50 mm and an average fiber diameter of 0.45mm is used in this concrete.

II. MIX PROPORTIONS

TABLE I: MIX PROPORTION WITH A MIX RATIO OF 1:1.31:2.84.

Mix Ratio	Cement (OPC)(%)	Epoxy Resin (%)	Fly Ash (%)	Metakaolin (%)	Bamboo Fiber (%)
M0	1	0	0	0	0
M1	5	7	2	1	0
M2	5	7	2	1	0
M3	5	7	2	1	0
M4	5	7	2	1	1
M5	5	7	2	1	1
M6	5	7	2	1	1
M7	5	7	2	1	1
M8	5	7	2	1	2

III. RESULT AND DISCUSSIONS

A. Compression test

150mm cube concrete samples with various concrete mix proportion are tested in a compression testing machine to find out their compression strength

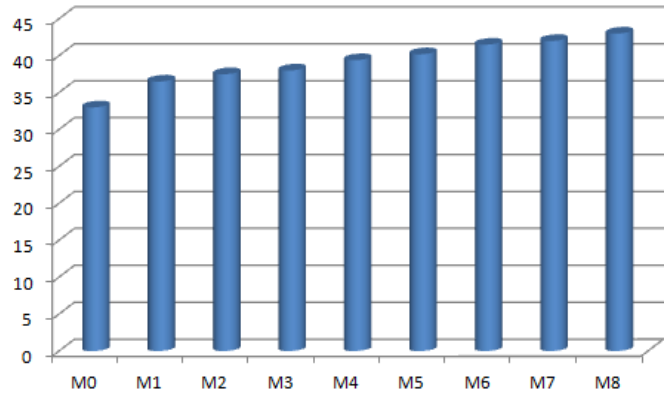

Fig. 1. Compression test results

B. Split Tensile Strength:

150 X300 mm cylinder concrete samples with various concrete mix proportions are tested in the compression testing machine to determine its split tensile strength. The split tensile strength test shows that the bamboo fiber reinforcement gives good improvement in concrete strength, which was influenced by the bamboo fiber content.

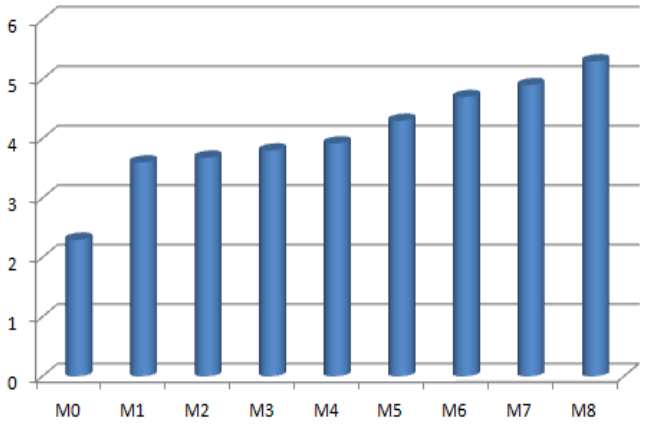

Fig. 2. Split tensile test results

IV. CONCLUSION

The experiment result showed that the compressive strength was considerably improved by adding bamboo fiber, tensile strength is also improved concerning increasing in bamboo fiber ratio in concrete.

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