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REVIEW ON EFFECT OF FIBER ADDITION ON MECHANICAL PROPERTIES OF CONCRETE

Nayan Dhere[1] , Swati Gharjale[2], Prakash Undre[3], Anand Alte[4] , Dr.Sanjay Kulkarni[5] , Prof. Jayant Kanase[6]

[1,2,3,4,5,6] *Department of civil engineering,*
[1,2,3,4] *UG students, Dr. D. Y. Patil School of Engineering and Technology, Lohegoan, Pune*
[5] *Associate Professor, Dr. D. Y. Patil School of Engineering and Technology, Lohegoan, Pune*
[6] *Assistant Professor, Dr. D. Y. Patil School of Engineering and Technology, Lohegoan, Pune*

Abstract— The present work deals with the effect of different types of steel fibers on various strengths of concrete are studied. The different fibers at a constant rate of 2.5 % by the weight of cement are used for the experimental work. Various strengths considered for investigation are compressive strength and split tensile strength. Results obtained are of different researchers and their experimental comparison of results of steel fiber reinforced concrete with that of normal concrete showed the significant improvements in the results of compressive strength and split tensile strength of concrete with different types of steel fiber with various constant volume fractions and different aspect ratio. Various researches found that steel fibers give the maximum strength in comparison to glass fibers.

Keywords— Concrete, Steel Fibre, Glass Fibre, Compressive strength, Split tensile strength.

I. INTRODUCTION

Fibre Reinforced Concrete (FRC) is a composite material made primarily from hydraulic cements, aggregates and discrete reinforcing fibres. These days constructions in civil engineering have their own structural and durability requirements. Concrete can be modified to perform in a more ductile manner by the addition of randomly distributed discrete fibers in the concrete matrix, which prevent and control initiation, propagation and coalescence of cracks. A variety of materials such as steel fibre, glass, can be used in fiber reinforced concrete.
The fibers which are dispersed in the concrete during mixing and thus improve concrete properties in all directions. Fibers help to improve the post peak ductility performance, pre-crack tensile strength, fatigue strength, impact strength and eliminate temperature and shrinkage cracks. The addition of steel fibers to concrete considerably improves its properties of concrete in the hardened stage such as flexural strength, impact strength, tensile strength, ductility and flexural toughness.

II. METHODOLOGY

A. 1. Materials:

1.1 Cement, fine aggregate, coarse aggregate, water, steel fiber and glass fibers were used in experimental work.

2. Methods:

2.1 Compressive Strength
Compressive strength of a concrete is a measure of its ability to resist static load, which tends to crush it. This test was performed to find the increase and differences of strength according the increasing percentage of fibre in the concrete. The compressive strength of concrete with different mixture proportions was determined at the age of 28 days according to IS 516-1959.

2.2 Split Tensile Strength

Split tensile strength was found according to IS: 5816–1999 and the same three cylindrical specimens were casted and tested after 28 days of water curing. The cylindrical specimens were of diameter 150 mm and of height 300 mm.

III. LITERATURE REVIEW

A. *INTERNATIONAL JOURNAL OF COMPUTER & MATHEMATICAL SCIENCES(IJCMS) ISSN 2347 – 8527 VOLUME 3, ISSUE 6 AUGUST 2014*

TITLE-"EFFECT OF FIBER ON PROPERTIES OF CONCRETE"2014

AUTHOR : VINAY KUMAR SINGH, DILIP KUMAR (2014)

The addition of fibers into the concrete mixture generinally improves the compressive strength at 28 days but there is 60% increase in flexural strength with the addition of 0.7% fiber in concrete.The 0.5% addition of fibers into the concrete shows better result in compressive strength and the 0.5% addition of fibers into the concrete shows better result in flexural strength.

B. INTERNATIONAL JOURNAL OF COMPUTER & MATHEMATICAL SCIENCES(IJCMS) ISSN 2347 – 8527 VOLUME 3, ISSUE 6 AUGUST 2014

TITLE: EFFECT OF STEEL FIBERS ON THE MECHANICAL PROPERTIES OF CONCRETE.

AUTHOR: PROF. S. S. PIMPLIKAR AND PSHTIWAN N. SHAKOR (2011)

He Conducted trial tests for concrete with glass fibre and without glass fibre to indicate the differences in compressive strength and flexural strength by using cubes of varying sizes.

They observed the compressive strength (N/mm2) of concrete with addition of 1.5% and 2% glass fiber are 65.18 and 56.74 at 7 days and greater than 80(unbroken) and 76.44 at 28 days respectively. They also observed the flexural Strength (N/mm2) of concrete with addition of 1.5% and 2% glass fiber are 5.55 and 5.17 at 7 days and 5.48 and 6.15 at 28 days respectively.

C. JOURNAL OF MATERIALS IN CIVIL ENGINEERING (JOMICE), ISSN 0899-1561 VOL. 19, NO. 5, MAY 1, 2007.

TITLE-"MECHANICAL PROPERTIES OF STEEL FIBER-REINFORCED CONCRETE" (2007)

AUTHOR: JOB THOMAS AND ANANTH RAMASWAMY

This paper presents the results from an experimental program and an analytical assessment of the influence of addition of fibers on mechanical properties of concrete. Models derived based on the various mechanical properties of steel fiber-reinforced concrete have been presented. The various strength properties studied are cube and cylinder compressive strength, split tensile strength The variables considered are grade of concrete, namely, normal strength 35 MPa, moderately high strength 65 MPa and the volume fraction of the fiber Vf =0.0, 0.5, 1.0 %.

D. JOURNAL OF MECHANICAL AND CIVIL ENGINEERING E-ISSN: 2278-1684,P-ISSN: 2320-334X, VOLUME 13, ISSUE 4 VER. V- 2016

TITLE: EFFECT OF GLASS FIBERS ON THE MECHANICAL PROPERTIES OF CONCRETE

AUTHOR: K.I.M.IBRAHIM

For any civil en Concrete is most widely used construction material in the world. The fibers used in FRC may be of different materials like steel, glass, asbestos, etc. The addition of these fibers into concrete mass can dramatically increase the compressive strength, tensile strength, flexural strength and impact strength of concrete. FRC brought down many different applications in civil engineering field. Results based on the lab experiment on FRC cube and cylinders specimens have been designed with glass fiber reinforced concrete (GFRC) containing glass fibers of 0% ,0.1% ,0.3% volume fraction.

IV. CONCLUSIONS

Following conclusion are drawn based on the result. The mechanical properties of concrete are enhanced with the addition of steel fiber and glass fiber. All the properties of concrete like compressive strength and split tensile strength is increased.

From the results and discussion it shows that for 3% addition of steel fiber concrete showing overall improvement.

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