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Maintenance & Treatment of R.C.C. Building by Fiber Reinforced Polymer- An Experimental Study

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ABSTRACT

For the external reinforcement needed to meet the structural systems' strength requirements for flexure and shear, Fiber Reinforced Polymer (FRP) is widely used. However, the strengthening of members under torsion has only lately been studied. Torsion failure is a bad brittle type of failure that needs to be avoided, especially in earthquake-prone areas. The behavior and effectiveness of rectangular reinforced concrete beams strengthened with externally bonded Fiber Reinforced Polymer (FRP) textiles under combined flexure and torsion are investigated experimentally in the current work.

KEYWORDS: *external, reinforcement, flexure, shear, Fiber Reinforced Polymer*

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INTRODUCTION

The maintenance, rehabilitation and upgrading of structural members, is perhaps one of the most crucial problems in civil engineering applications. Moreover, a large number of structures constructed in the past using the older design codes in different parts of the world are structurally unsafe according to the new design codes. Since replacement of such deficient elements of structures incurs a huge amount of public money and time, strengthening has become the acceptable way of improving their load carrying capacity and extending their service lives. Infrastructure decay caused by premature deterioration of buildings and structures has lead to the investigation of several processes for repairing or strengthening purposes. One of the challenges in strengthening of concrete structures is selection of a strengthening method that will enhance the strength and serviceability of the structure while addressing limitations such as constructability, building operations, and budget. Structural strengthening may be required due to many different situations.

OBJECTIVES OF THE PRESENT STUDY

- To study the effect of FRP strengthening on ultimate load carrying capacity of reinforced concrete beams.
- To study the effect of FRP strengthening on the shear behaviour of reinforced concretebeams.

LITERATURE SURVEY

R. Manoharan, R. Rajkumar, B. Gokula Krishnan… in Advances in Manufacturing Processes (2019)Mechanical properties of GPC are different compared over NSC; this is due to change in cracking behavior under the application of load. Compressive strength, flexural strength, modulus of elasticity and in-pl...

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Fresh and hardened properties of concrete incorporating binary blend of metakaolin and ground granulated blast furnace slag as supplementary cementitious material. Advances in Civil Engineering, 2020

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Fouad B. A. Beshara, Youssef M. H. Hammad… in Innovative Infrastructure Solutions (2021)
Concrete is one of the most widely used construction material. Its usage is twice that of steel, wood, plastics and aluminum combined. It provides superior fire resistance compared with wooden construction an...

Milu Reji, V. V. Anu in Proceedings of SECON 2020 (2021)
The present study is an attempt for strengthening the reinforced concrete beam damaged due to overloading using polymer ferrocement laminates which were directly glued into the cracked tension face of the beam...

N. R. Harish Kumar, Sachin R. Biradar, R. Prabhakara… in Recent Trends in Civil Engineering (2021)This chapter presents the seismic simulation systems (shaking tables) as essential resources for experimental research on adobe masonry structures. An overview of selected relevant shaking tables

METHODOLOGY

MATERIAL & SPECIFICATIONS

Concrete is a construction material composed of Portland cement and water combined with sand, gravel, crushed stone, or other inert material such as expanded slag or vermiculite. The cement and water form a paste which hardens by chemical reaction into a strong, stone-like mass. The inert materials are called aggregates, and for economy no more cement paste is used than is necessary to coat all the aggregate surfaces and fill all the voids. The concrete paste is plastic and easily molded into any form to produce a smooth surface. Hardening begins immediately, but precautions are taken, usually by covering, to avoid rapid loss of moisture since the presence of water is necessary to continue the chemical reaction and increase the strength. Too much water, however, produces a concrete that is more porous and weaker. The quality of the paste formed by the cement and water largely determines the character of the concrete.

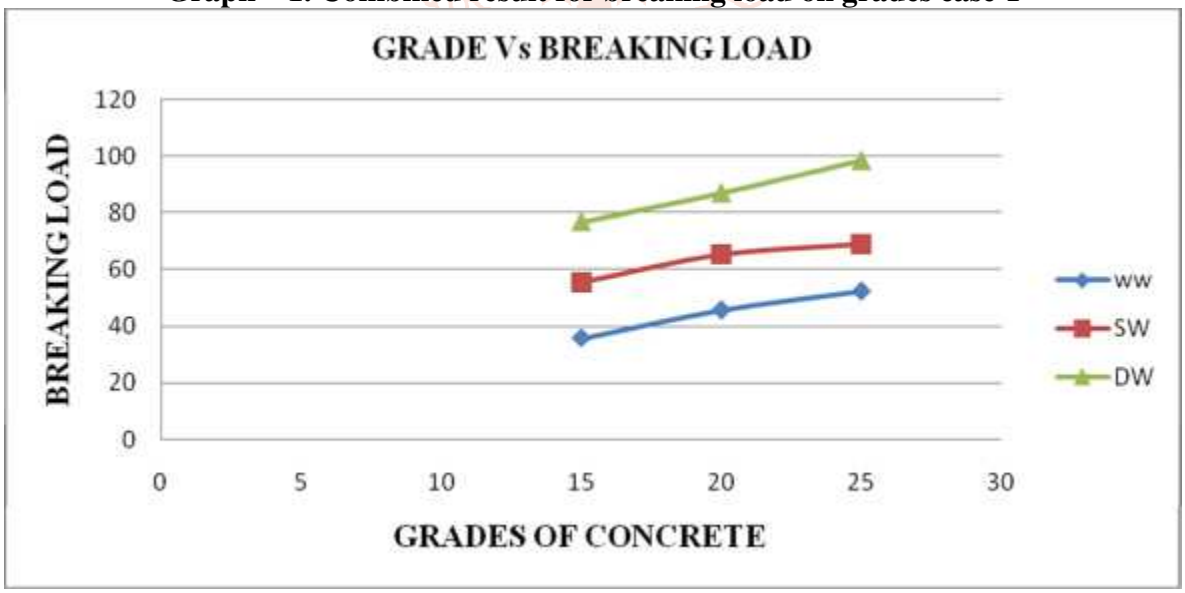
Table 1 Size of the specimen for tensile test

Length(mm)	Width(mm)	Thickness(mm)
200	24	0.6

Table 2 Results for M-15 grade of concrete in Case –I

Sr. No.	Grade of Concrete	Cylinder Status	Breaking Load (MT)	Strength Kg/cm2	Remark
1.	M-15	Withoutwarp	35.75	202.40	Initial stage
2.	M-15	Singlewarp	55.45	313.94	Increased by55%from initial stage
3.	M-15	Doublewarp	77	435.95	Increased by38.86%from single warp

Graph – 1. Combined result for breaking load on grades case-I



CONCLUSION

For M-15 concrete grade cylinders-

Firstly we have checked the strength of normal concrete cylinder without FRP warp which is taken out for all four cases average value of compressive strength is 199.35 Kg/cm^2. After thatwe applied FRP on concrete cylinder with single warp and strength was tested which is taken out for all four cases

average value of compressive strength are 318.51 Kg/cm^2 increased by 59.7% from initial stage. Now after testing FRP on concrete with single warp we applied double warp of FRP on concrete for testing the strength of cylinder and we get the strength for all four cases average value of compressive strength are 429.25 Kg/cm^2 which is increased by 34.76% from single warp and 115% from initial stage.

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