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BEAM FLEXURAL STRENGTH ENHANCEMENT WITH BASALT POLYMER REBAR

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Abstract -Basalt fiber reinforced polymer (BFRP) is a new material, which is used in constructionas an alternative material to steel rebar. This paper reviews the experimental investigation carried out to evaluate the performance characteristics basalt polymer rebar in concrete beams. The beams were tested of M30 Grade concrete and reinforced with basalt rebar. Totally 3 beams were casted basalt fiber reinforced polymer provided as a reinforcement. Test are made to find the flexural capacity of the beam. Load deflection curve were plotted.

Key Words:Basalt, Fiber, Deflection

1.INTRODUCTION *(Size 11, Times New roman)*

fiber materials are being involved effectively in construction field. It is one of the main developments which has occurred in the composites polymer industry in the recent years made from basalt rock which is currently available for making Basalt fiber polymer rod. Basalt fiber can be extruded from molten basalt rock at in a single stage process. The fiber production process is like the process used for the production of glass fiber. Basalt bars have various advantages compared with that of normal steel and other composites used as reinforcement. The characteristics of BFRP are: (1) mechanical properties (a) High tensile strength (b) Young's modulus. (2) Chemically inert, acidic, alkaline states. (3) High thermal stability - effective in insulating, electrical and sound properties (4) less weight and reduced self-weight characteristics. (5) Low elastic - moduli when compared to other fiber composites and conventional steel. (Values provided based on various literature studies, the exact values are decided only by the manufacturer based on quality of materials involved in manufacturing) where, BFRP bar is 4 times lighter weight than steel reinforcement weight with equal strength characteristics, which significantly reduces transportation costs for shipping, loading and unloading, as well as operating expenses at the construction site.

2. Material

- **Cement**

Cementinconcreteactsasabindingmaterialthathardenaftertheaddition of water.Itplaysanimportantroleinconstructionsector.Inthis study theOrdinary PortlandCement(OPC)of 53 gradesis used.Various tests wereperformedon cementtheyare:Soundnesstest,Consistencytest,InitialandFinalsettingtime.

- **Fine Aggregate**

Locally available river sand of specific gravity 2.65, fineness modulus 2.7, and conforming to Zone II was used as fine aggregate. The crushed granite stone with a maximum size of 20mm, and specific gravity 2.75 was used as coarse aggregate

- **Water:**

Water is used for both mixing and curing of the slab specimen as per the guidelines of IS:456:2000 & IS:3025-1964 PART 22

- **Basalt Fiber**

8mm diabasalt fiber rod used for the basalt Rod Beam

3. Experimental Analysis

The beams were tested of M30 Grade concrete and reinforced with basalt rebar. 1000m x150 mm x 200 mm beam with 8mm basalt fiber bar as reinforcement. Casting is a manufacturing process in which a flowable material is usually poured into a mould, which contains a hollow cavity of the desired shape, and then allowed to solidify. Curing is done to retard or reduce the evaporation of moisture from concrete. Curing is done for 28 days.The size of the specimen going to be casted are 1 m length. The Beam and samples are tested on 1.Compressive Strength Test, 2. Flexural Strength

Table -1: Compressive Strength N/mm2

Trail	Compressive Strength N/mm^2
1	37.60
2	37.20
3	37.40

Table -2: Loading Results

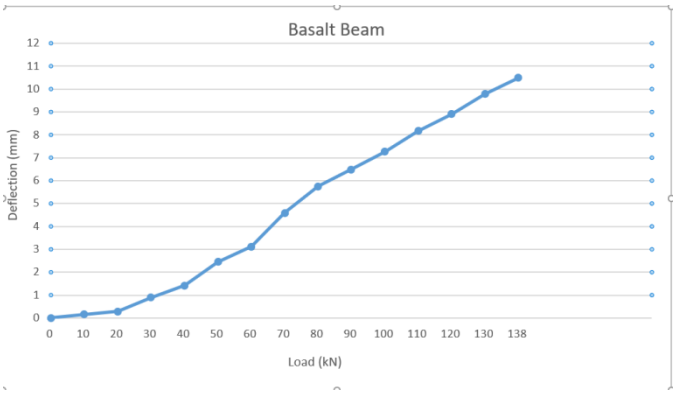
Beam Series	Cracking Load (kN)	Ultimate Load (kN)
Basalt	30	138

Table -3: Loading-Deflection Behavior

Load	Deflection (mm)
	Basalt Rod Beam
0	0
10	0.15

20	0.28
30	0.88
40	1.43
50	2.45
60	3.11
70	4.59
80	5.75
90	6.48
100	7.27
110	8.16
120	8.90
130	9.78
138	10.48

Charts



3. CONCLUSIONS

Tests were conducted for of basalt fiber reinforced concrete beams and their flexural strength behavior and deflection behavior.It is observed that the beam specimens of M30 grade reinforced with basaltfiberbars carried a maximum load of 138kN

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