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AN EXPERIMENTAL INVESTIGATION ON GEOPOLYMER CONCRETE WITH FERRO CEMENT

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ABSTRACT

This undertaking presents the experimental investigation of the resistance of geopolymer mortar slabs to impact loading. For this, specimens of size 200mmx210mmx100mm. The effects acquired display that the addition of the above mesh reinforcement has improved the impact residual electricity ratio of geopolymer ferrocement by using 4-28 that of the reference undeniable ferrocement mortar slab. The aggregate of one layer of weld mesh and 4 layers of chicken mesh of geopolymer ferrocement specimens show the quality performance within the test, i.E. Electricity absorbed, residual effect strength ratio (I-rs), It changed into concluded that the boom in Volume fraction of reinforcement V-r, increases the power absorption and additionally residual impact strength ratio of geopolymer ferrocement than that of ferrocement specimens.

INTRODUCTION

Concrete utilization around the world is 2d only to water. Ordinary Portland cement (OPC) is conventionally used as the primary binder to produce concrete. The environmental problems related to the production of OPC are widely recognized. The amount of the carbon dioxide launched all through the manufacture of OPC because of the calcination of limestone and combustion of fossil fuel is in the order of 1 ton for every ton of OPC produced. In addition, the quantity of power required to provide OPC is most effective subsequent to metal and aluminum.

On the alternative hand, the ample availability of fly ash worldwide creates possibility to make use of this by-product of burning coal, rather for OPC to manufacture cement products. When used as a partial replacement of OPC, in the presence of water and in ambient temperature, fly ash reacts with the calcium hydroxide at some point of the hydration system of OPC to form the calcium silicate hydrate (C-S-H) gel. The improvement and alertness of high quantity fly ash concrete, which enabled the alternative of OPC as much as 60% by way of mass is a extensive improvement.

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EXPEREMENTAL PROGRAM

Stress - Strain and load-displacement values for C 1:1 (0layers):-

DISPLACEMENT (mm)	LOAD (KN)	STRAIN	STRESS (N/mm2)	INITIAL TANGENT LINE	AREA
0	0	0	0	0	0
0.001	10	0.000005	1	0.9588	0.005
0.005	20	0.000025	2	4.794	0.06
0.021	30	0.000105	3	20.1348	0.4
0.035	40	0.000175	4	33.558	0.49
0.061	50	0.000305	5	58.4868	1.17
0.076	55	0.00038	5.5	72.8688	0.7875
0.089	60	0.000445	6	85.3332	0.7475
0.123	70	0.000615	7	117.9324	2.21
0.145	75	0.000725	7.5	139.026	1.596
0.167	80	0.000835	8	160.1196	1.705
0.189	85	0.000945	8.5	181.2132	1.815
0.212	90	0.00106	9	203.2656	2.0125
0.245	95	0.001225	9.5	234.906	3.0525
0.267	100	0.001335	10	255.9996	2.145
0.298	110	0.00149	11	285.7224	3.255
0.312	120	0.00156	12	299.1456	1.61
0.334	130	0.00167	13	320.2392	2.75
0.378	140	0.00189	14	362.4264	5.94
0.412	150	0.00206	15	395.0256	4.93

0.456	170	0.00228	17	437.2128	7.04
0.5	180	0.0025	18	479.4	7.7
0.534	180	0.00267	18	511.9992	6.12
0.567	200	0.002835	20	543.6396	6.27
0.632	170	0.00316	17	605.9616	12.025
				Toughness	70.33 KN-mm

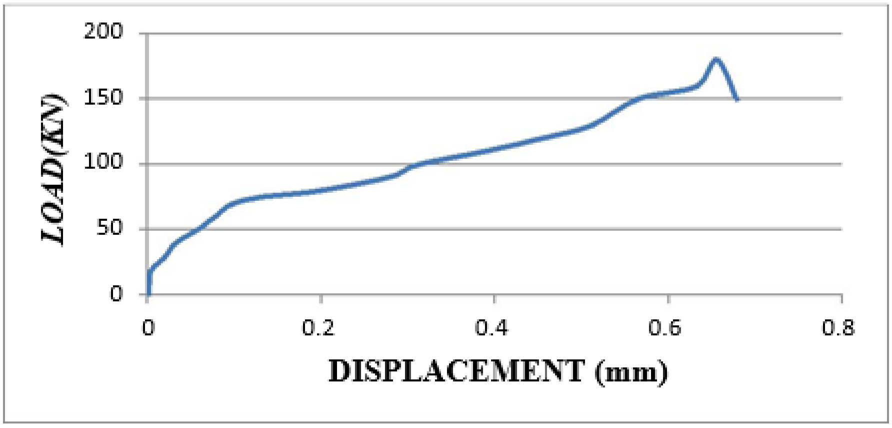

Fig 2.2 Graphical representation of load-displacement for **C 1:1(0** layers).

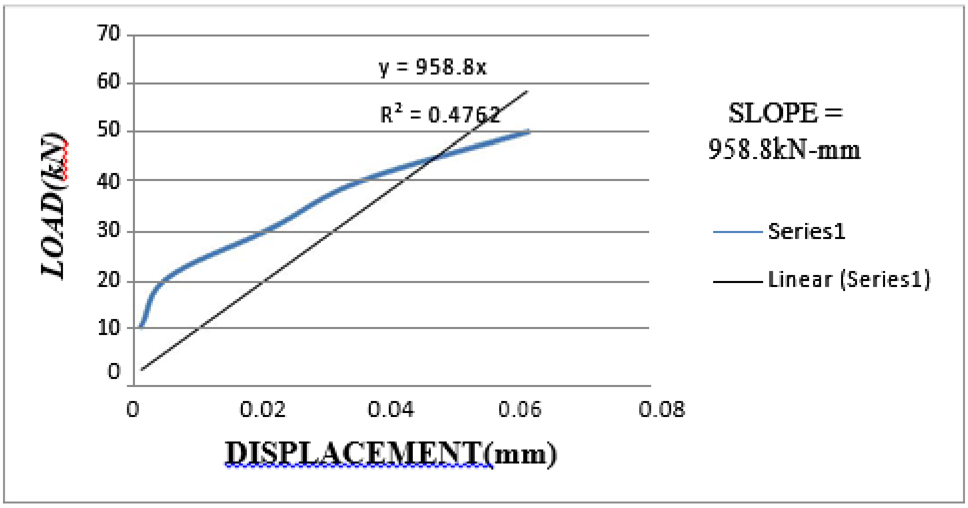

Fig 2.3 linear fit for **C 1:1(0** layers)

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Load displacement and Stress - Strain values for C 1:1.5 (4 layers):-

LOAD (KN)	DISPLACEMENT (mm)	STRAIN	STRESS (N/mm²)	Initial tangent line	AREA
0	0	0	0	0	
15	0.018	0.00009	1.5	15.678	0.135
20	0.023	0.000115	2	20.033	0.0875
30	0.034	0.00017	3	29.614	0.275
45	0.048	0.00024	4.5	41.808	0.525
50	0.067	0.000335	5	58.357	0.9025
60	0.089	0.000445	6	77.519	1.21
65	0.112	0.00056	6.5	97.552	1.4375
70	0.134	0.00067	7	116.714	1.485
80	0.167	0.000835	8	145.457	2.475
90	0.189	0.000945	9	164.619	1.87
95	0.256	0.00128	9.5	222.976	6.1975
100	0.289	0.001445	10	251.719	3.2175
110	0.312	0.00156	11	271.752	2.415
120	0.385	0.001925	12	335.335	8.395
130	0.412	0.00206	13	358.852	3.375
140	0.456	0.00228	14	397.176	5.94
150	0.498	0.00249	15	433.758	6.09
160	0.512	0.00256	16	445.952	2.17
170	0.546	0.00273	17	475.566	5.61
180	0.577	0.002885	18	502.567	5.425
190	0.598	0.00299	19	520.858	3.885
200	0.634	0.00317	20	552.214	7.02
150	0.655	0.003275	15	570.505	3.675
				toughness	73.818kN-mm

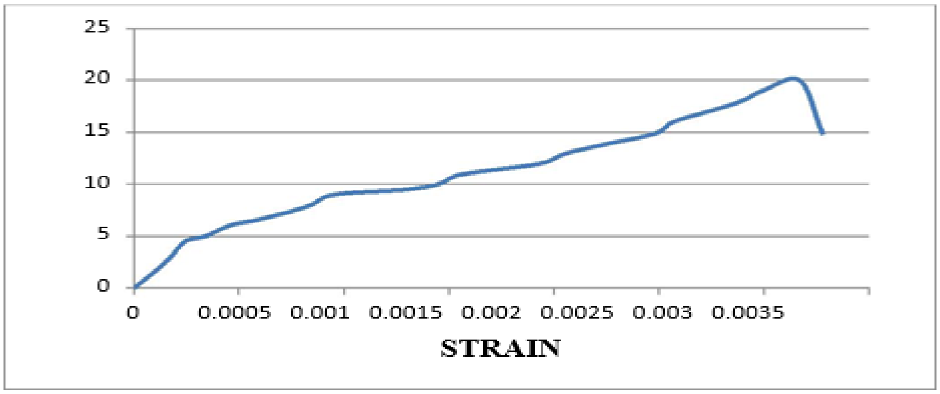

Fig 5.1 Graphical representation of stress-strain curve for **C 1:1.5(4** layers).

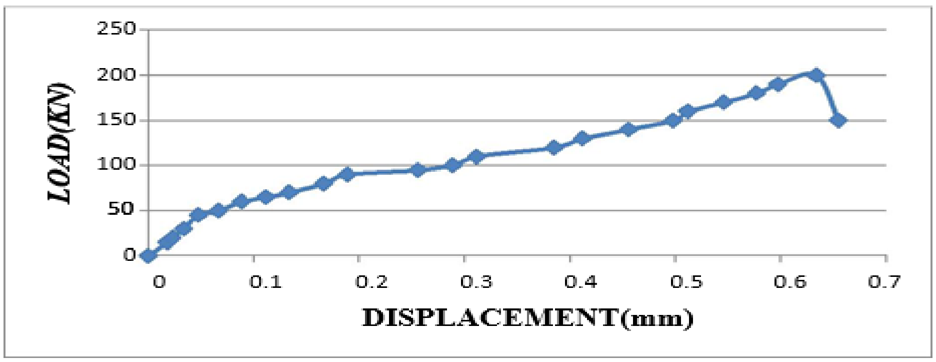

Fig 5.2 Graphical representation of load-displacement for **C 1:1.5(4** layers).

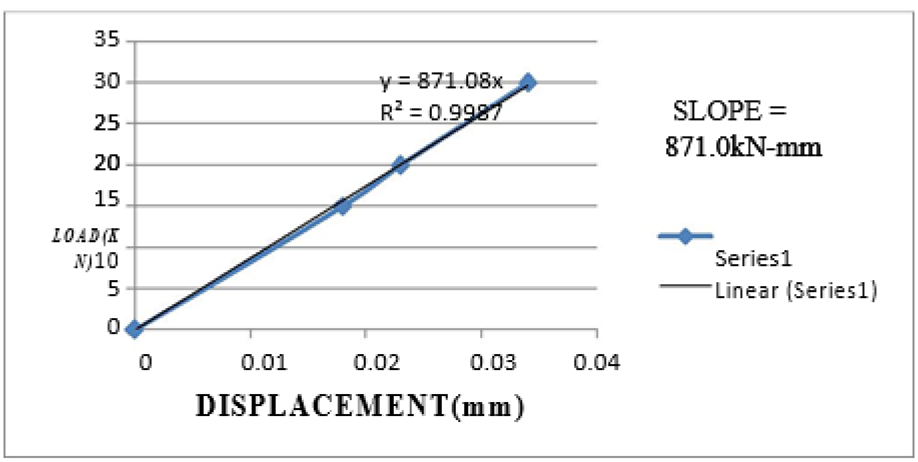

Fig5.3 linear fit for **C 1:1.5(4** layers).

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Load displacement and Stress - Strain values for C 1:1.5 (8 layers):-

DISPLACEMENT (mm)	LOAD (KN)	STRAIN	STRESS (N/mm²)	Initial tangent line	AREA
0	0	0	0	0	
0.015	15	7.5E-05	1.5	8.814	0.1125
0.034	20	0.00017	2	19.9784	0.3325
0.054	30	0.00027	3	31.7304	0.5
0.076	40	0.00038	4	44.6576	0.77
0.098	50	0.00049	5	57.5848	0.99
0.121	60	0.00061	6	71.0996	1.265
0.154	70	0.00077	7	90.4904	2.145
0.189	80	0.00095	8	111.0564	2.625
0.212	90	0.00106	9	124.5712	1.955
0.234	100	0.00117	10	137.4984	2.09
0.267	110	0.00134	11	156.8892	3.465
0.283	130	0.00142	13	166.2908	1.92
0.299	140	0.0015	14	175.6924	2.16
0.312	150	0.00156	15	183.3312	1.885
0.342	160	0.00171	16	200.9592	4.65
0.356	170	0.00178	17	209.1856	2.31
0.376	180	0.00188	18	220.9376	3.5
0.389	190	0.00195	19	228.5764	2.405
0.412	200	0.00206	20	242.0912	4.485
0.445	210	0.00223	21	261.482	6.765
0.489	220	0.00245	22	287.3364	9.46
0.512	230	0.00256	23	300.8512	5.175
0.545	270	0.00273	27	320.242	8.25
0.589	240	0.00295	24	346.0964	11.22
				toughness=	80.435KN-mm

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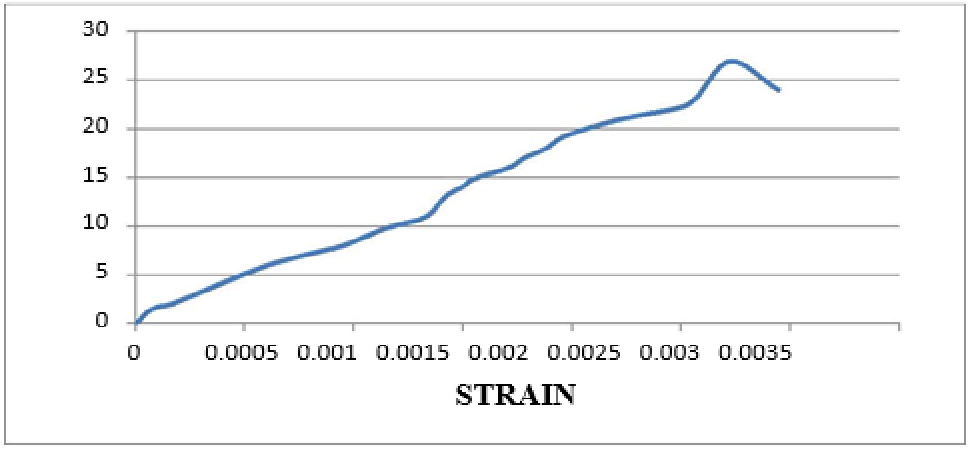

Fig 13.1 Graphical representation of stress-strain for **C 1:1.5(8** layers).

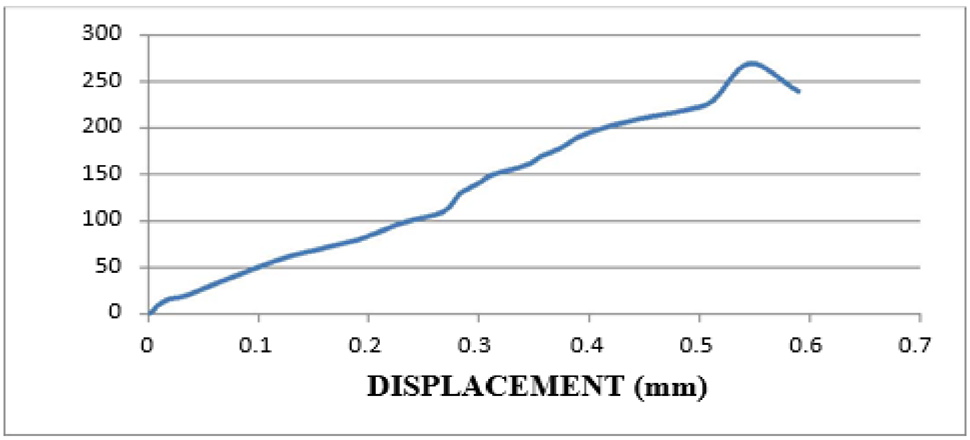

Fig 13.2 Graphical representation of load-displacement for **C 1:1.5(8** layers).

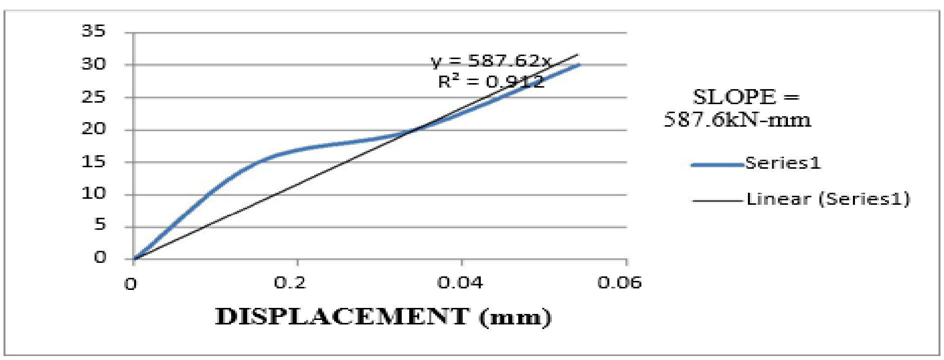

Fig 13.3 linear fit for **C 1:1.5(8** layers).

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Load displacement and Stress - Strain values for C 1:1 (8 layers):-

DISPLACEMENT (mm)	LOAD (KN)	STRAIN	STRESS (N/mm^2)	Initial tangent line	AREA
0	0	0	0	0	
0.023	10	0.000115	1	6.325	0.115
0.045	15	0.000225	1.5	12.375	0.275
0.078	20	0.00039	2	21.45	0.5775
0.112	30	0.00056	3	30.8	0.85
0.167	40	0.000835	4	45.925	1.925
0.202	50	0.00101	5	55.55	1.575
0.278	60	0.00139	6	76.45	4.18
0.323	70	0.001615	7	88.825	2.925
0.367	85	0.001835	8.5	100.925	3.41
0.412	90	0.00206	9	113.3	3.9375
0.467	100	0.002335	10	128.425	5.225
0.512	110	0.00256	11	140.8	4.725
0.545	120	0.002725	12	149.875	3.795
0.589	125	0.002945	12.5	161.975	5.39
0.6	140	0.003	14	165	1.4575
0.623	80	0.003115	8	171.325	2.53
0.645	70	0.003225	7	177.375	1.65
				toughness	47.2 KN-mm

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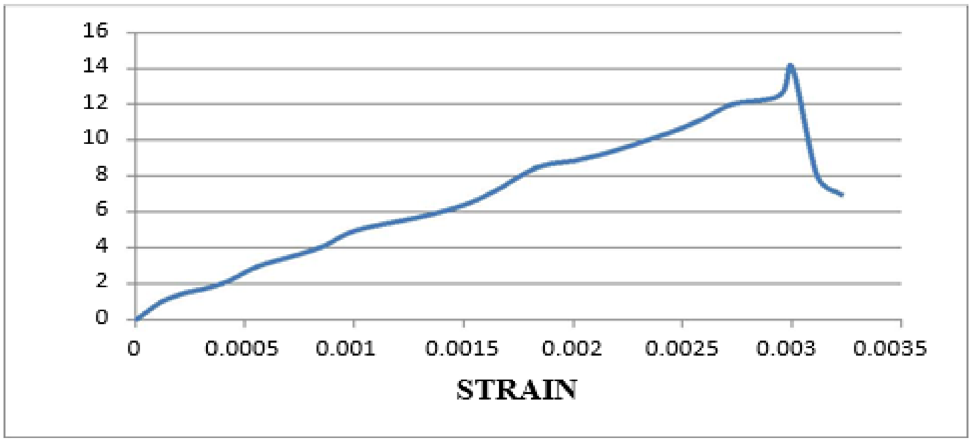

Fig 15.1 Graphical representation of stress-strain for **G 1:1 (8** layers).

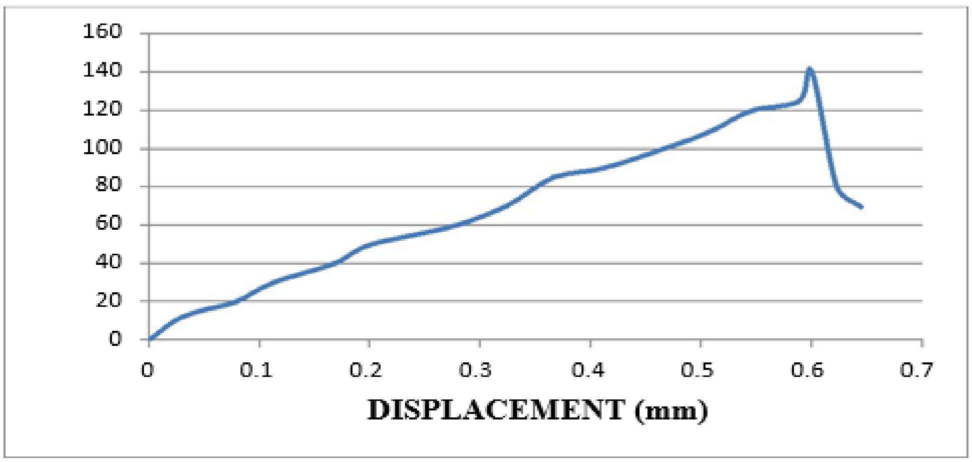

Fig 15.2 Graphical representation of load-displacement for **G 1:1 (8** layers).

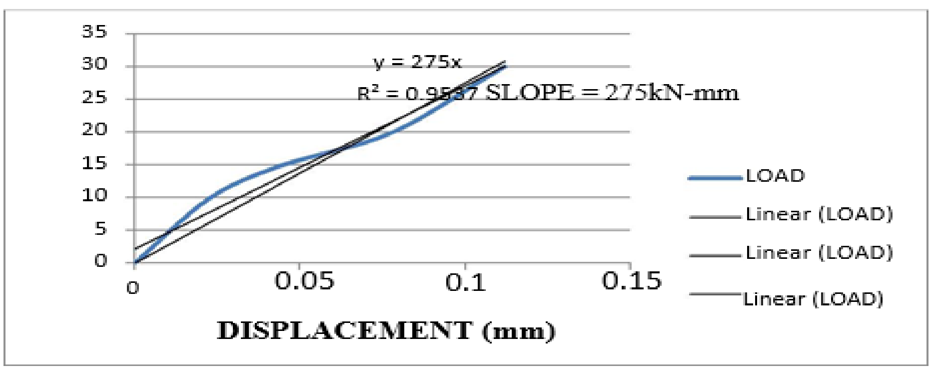

Fig 15.3 linear fit for **G 1:1 (8** layers).

CONCLUSIONS:

- We used fly ash received from bituminous coal which contains 10% CaO, fly ash from sub bituminous coal shall additionally be determined.
- Rice husk ash and GGBS shall be attempted instead of fly ash and properties will be decided.
- Investigation ought to be made on Structural contributors like beams, columns, and slabs using geopolymer as binder.
- Using oven curing technology to enhance preliminary power of geo polymer participants.

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