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Model Prediction on Split Tensile Strength of Concrete from Course Aggregate and Granite Modified with Metakaolin Substance

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Abstract

The purpose of this is to paper monitor the rate of split tensile on concrete modified with Metakaolin substance, the study try to detailed the behavior of the material on its rate of strength, linear trend were experienced in all the figures from the graphical representation to the optimum level, the study monitor the tensile strength obtained at different curing age, the research study has express the rate of tensile in these materials modified with Metakaolin content through it modeling techniques, the variation of percentage content of the substance were observed to influence the mix designed applied to determine the tensile strength of the concrete, the study has also observed the influenced from water cement ratio in the development of the derived model, numerical simulation were applied in the study to monitor the resistance to force of the material at every twenty four hours of curing. The study were able to generate tensile parameters based on the rate of mixed proportion influenced by concrete characteristic, this may not have been consider in experimental parameters that has also reflect its influence on the growth rate of tensile strength concrete. Numerical simulation was applied in the study, this express the growth rate of tensile strength at twenty four hours of curing, the study has developed model from non-homogeneous system that can monitor tensile strength of concrete made from coarse aggregate, granite, with Metakaolin substance as partial replacement of cement.

Keywords: Model prediction split tensile; Concrete; Aggregate granite; Metakaolin

Introduction

The tensile strength of concrete is one of the significant parameter in the design of civil engineering structures. In order to determine the tensile strength of concrete for existing structures, experiments are necessary [1-3]. Cement may be pure Portland cement, or it made from Portland cement mixed with other materials that also have cementitious properties such as supplementary cementing materials [4,5]. The mortar and concrete properties, both in fresh and hardened cases, can be enhanced by cement composed of mixtures of Portland cement with these other additives; concrete enhancement worldwide has been corroborated by continuous improvement of these additives [6]. These SCMs have been utilized very commonly as pozzolanas materials in concrete and have showed a considerable effect to improve the mechanical and durability properties of concrete [7-10]. The amount of water reducer added to the concrete mix is in direct proportion to the amount of Metakaolin replacement [11-13]. Some of the polymers provide higher tensile and flexural strength for concrete compared to compressive strength. In addition, they provide good resistance to physical damage such as abrasion, erosion, and impact of chemical substances attack by reducing the porosity [14]. Most commercial polymer latexes for polymer-based admixtures contain proper antifoaming agents and can be generally used without the addition of antifoaming agent's during mixing [13]. The Portland limestone cements indicate competitive concrete properties and improve the corrosion performance of the concrete as mentioned [11,15-21].

Theoretical Background

$$\frac{d_{cd}}{dx} + V(y)C_d = \phi(y)C_d^n \quad (1.0)$$

Dividing equation (1.0) all through by we have

$$C_d^{-n}\frac{d_{cd}}{dx} + v(x)C_d^{1-n} = \phi(y) \quad (1.1)$$

Let

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$$P = p = c_d^{1-n}$$
(1.2)

$$\frac{dp}{dy} = (1-n)c_d^{-n}\frac{d_{cd}}{dy} \qquad (1.3)$$

Substituting equation (1.2) and (1.3) into equation (1.1) we have that

$$c_d^{n}\frac{d_{cd}}{dy} = \frac{1}{1-n}\frac{dp}{dy} \qquad (1.4)$$

Integrating both sides we have

$$\int d[e^{V(y)(1-n)y}p] = \phi(y)(1-n)\int e^{V(y)(1-n)y}dy$$

$$\frac{1}{1-n}\frac{dp}{dy} + V(y)p = \phi(y) \qquad (1.5)$$

Substituting equation (1.2) into equation (1.13) we have

$$c_d^{1-n} = \frac{\phi(y)}{Vu(y)} + Ae^{=Vu(y)(1-n)y} \qquad (1.6)$$

Material and Method

Apparatus required

1. Weights and weighing device.
2. Tools, containers and pans for carrying materials & mixing.
3. A circular cross-sectional rod (φl6 mm & 600 mm length).
4. Testing machine 5.
5. Three cylinders (φ150 mm & 300 mm in height).
6. 6-A jig for aligning concrete cylinder and bearing strips.
7. 1 Prepare three cylindrical concrete specimens following same steps as test No.32.
8. After molding and curing the specimens for seven days in water, they can be tested.
9. Two bearings strips of nominal (1/8 in i.e. 3.175 mm) thick plywood, free of imperfections, approximately (25 mm) wide, and of length equal to or slightly longer than that of the specimen should be provided for each specimen.
10. The bearing strips are placed between the specimen and both upper and lower bearing blocks of the testing machine or between the specimen and the supplemental bars or plates.
11. Draw diametric lines an each end of the specimen using a suitable device that will ensure that they are in the same axial plane. Centre one of the plywood strips along the Centre of the lower bearing block.
12. Place the specimen on the plywood strip and align so that the lines marked on the ends of the specimen are vertical and centered over the plywood strip.
13. Place a second plywood strip lengthwise on the cylinder, centered on the lines marked on the ends of the cylinder.
14. Apply the load continuously and without shock, at a constant rate within, the range of 689 kPa/min to 1380 kPa/min splitting tensile stress until failure of the specimen.
15. Record the maximum applied load indicated by the testing machine at failure. Note the type of failure and appearance of fracture.

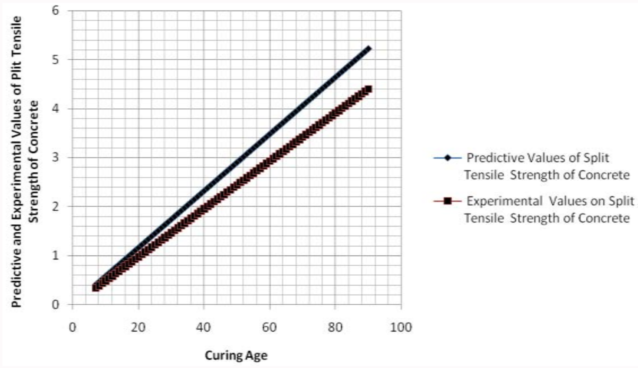

Figure 1: Predictive and Experimental Value of Split Tensile Techniques at Different Curing Age.

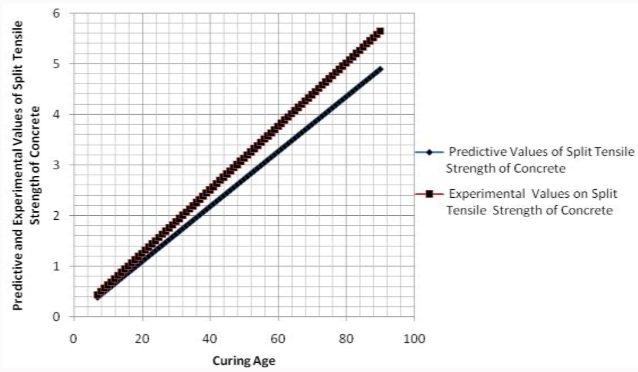

Figure 2: Predictive and Experimental Value of Split Tensile Techniques at Different Curing Age.

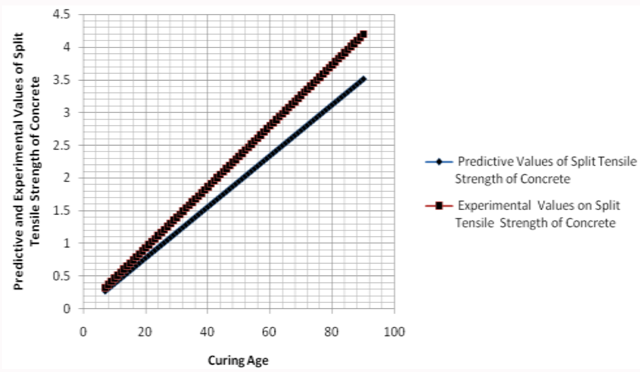

Figure 3: Predictive and Experimental Value of Split Tensile Techniques at Different Curing Age.

Observations and calculations: Calculate the splitting tensile strength of the specimen as follows: T=2P/Ld

Where: T: Splitting Tensile Strength; N/mm^2 P: Maximum Applied Load Indicated by Testing Machine; NL: Length of the Specimen; mmd: Diameter of the Specimen, mm

Results and Discussion

Figure 1-6 shows in the trend as the split tensile gradual increase to the optimum values recorded at ninety days of curing age, linear trend were observed in all the figures, this implies that the increase in age influenced the increase in the tensile strength of the material,

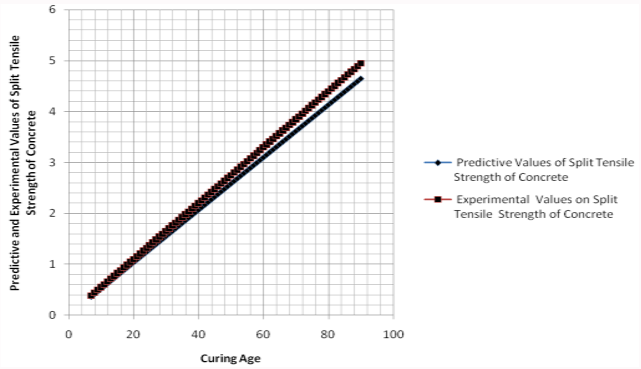

Figure 4: Predictive and Experimental Value of Split Tensile Techniques at Different Curing Age.

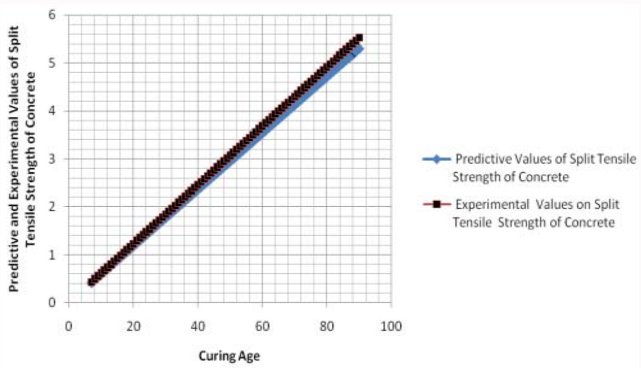

Figure 5: Predictive and Experimental Value of Split Tensile Techniques at Different Curing Age.

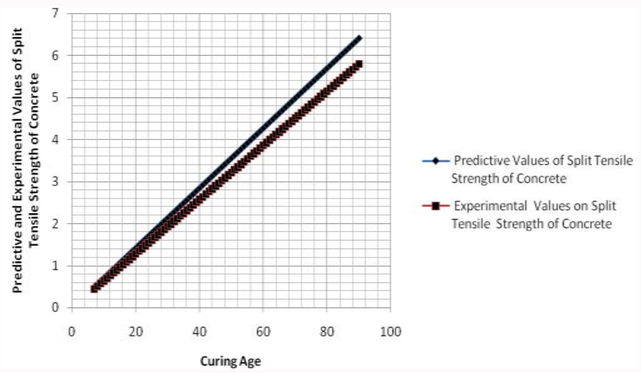

Figure 6: Predictive and Experimental Value of Split Tensile Techniques at Different Curing Age.

the tensile strength are generated from coarse aggregate and granite combinations, it has shown the behavior of the material at very figure in the study, such condition shoes the rate at which the materials can experiences crack due it level of brittleness in nature, these are observed to be monitored based on change in curing age, this figures has express to the extent of crack from materials modified with Metakaolin, the percentage as partial replacement were observed to influenced the concrete rate of tensile from all the figures, these can also be observed from the increase in the tensile strength of the material thus variation of tensile material at different figures, the derived model simulation values were validated with experimental data, correlation were observed between both parameters in all the figures.

Table 1: Predictive and Experimental Value of Split Tensile Techniques at Different Curing Age.

Curing Age	Predictive Values of Split Tensile Strength of Concrete	Experimental Values on Split Tensile Strength of Concrete
7	0.40593	0.341684
8	0.46392	0.390496
9	0.52191	0.439308
10	0.5799	0.48812
11	0.63789	0.536932
12	0.69588	0.585744
13	0.75387	0.634556
14	0.81186	0.683368
15	0.86985	0.73218
16	0.92784	0.780992
17	0.98583	0.829804
18	1.04382	0.878616
19	1.10181	0.927428
20	1.1598	0.97624
21	1.21779	1.025052
22	1.27578	1.073864
23	1.33377	1.122676
24	1.39176	1.171488
25	1.44975	1.2203
26	1.50774	1.269112
27	1.56573	1.317924
28	1.62372	1.366736
29	1.68171	1.415548
30	1.7397	1.46436
31	1.79769	1.513172
32	1.85568	1.561984
33	1.91367	1.610796
34	1.97166	1.659608
35	2.02965	1.70842
36	2.08764	1.757232
37	2.14563	1.806044
38	2.20362	1.854856
39	2.26161	1.903668
40	2.3196	1.95248
41	2.37759	2.001292
42	2.43558	2.050104
43	2.49357	2.098916
44	2.55156	2.147728
45	2.60955	2.19654
46	2.66754	2.245352
47	2.72553	2.294164
48	2.78352	2.342976
49	2.84151	2.391788
50	2.8995	2.4406
51	2.95749	2.489412
52	3.01548	2.538224
53	3.07347	2.587036
54	3.13146	2.635848
55	3.18945	2.68466
56	3.24744	2.733472
57	3.30543	2.782284
58	3.36342	2.831096
59	3.42141	2.879908
60	3.4794	2.92872
61	3.53739	2.977532
62	3.59538	3.026344
63	3.65337	3.075156

64	3.71136	3.123968
65	3.76935	3.17278
66	3.82734	3.221592
67	3.88533	3.270404
68	3.94332	3.319216
69	4.00131	3.368028
70	4.0593	3.41684
71	4.11729	3.465652
72	4.17528	3.514464
73	4.23327	3.563276
74	4.29126	3.612088
75	4.34925	3.6609
76	4.40724	3.709712
77	4.46523	3.758524
78	4.52322	3.807336
79	4.58121	3.856148
80	4.6392	3.90496
81	4.69719	3.953772
82	4.75518	4.002584
83	4.81317	4.051396
84	4.87116	4.100208
85	4.92915	4.14902
86	4.98714	4.197832
87	5.04513	4.246644
88	5.10312	4.295456
89	5.16111	4.344268
90	5.2191	4.39308

Table 2: Predictive and Experimental Value of Split Tensile Techniques at Different Curing Age.

Curing Age	Predictive Values of Split Tensile Strength of Concrete	Experimental Values on Split Tensile Strength of Concrete
7	0.38031	0.438963
8	0.43464	0.501672
9	0.48897	0.564381
10	0.5433	0.62709
11	0.59763	0.689799
12	0.65196	0.752508
13	0.70629	0.815217
14	0.76062	0.877926
15	0.81495	0.940635
16	0.86928	1.003344
17	0.92361	1.066053
18	0.97794	1.128762
19	1.03227	1.191471
20	1.0866	1.25418
21	1.14093	1.316889
22	1.19526	1.379598
23	1.24959	1.442307
24	1.30392	1.505016
25	1.35825	1.567725
26	1.41258	1.630434
27	1.46691	1.693143
28	1.52124	1.755852
29	1.57557	1.818561
30	1.6299	1.88127
31	1.68423	1.943979
32	1.73856	2.006688
33	1.79289	2.069397
34	1.84722	2.132106
35	1.90155	2.194815
36	1.95588	2.257524
37	2.01021	2.320233
38	2.06454	2.382942
39	2.11887	2.445651
40	2.1732	2.50836
41	2.22753	2.571069
42	2.28186	2.633778
43	2.33619	2.696487
44	2.39052	2.759196
45	2.44485	2.821905
46	2.49918	2.884614
47	2.55351	2.947323
48	2.60784	3.010032
49	2.66217	3.072741
50	2.7165	3.13545
51	2.77083	3.198159
52	2.82516	3.260868
53	2.87949	3.323577
54	2.93382	3.386286
55	2.98815	3.448995
56	3.04248	3.511704
57	3.09681	3.574413
58	3.15114	3.637122
59	3.20547	3.699831
60	3.2598	3.76254
61	3.31413	3.825249
62	3.36846	3.887958
63	3.42279	3.950667
64	3.47712	4.013376
65	3.53145	4.076085
66	3.58578	4.138794
67	3.64011	4.201503
68	3.69444	4.264212
69	3.74877	4.326921
70	3.8031	4.38963
71	3.85743	4.452339
72	3.91176	4.515048
73	3.96609	4.577757
74	4.02042	4.640466
75	4.07475	4.703175
76	4.12908	4.765884
77	4.18341	4.828593
78	4.23774	4.891302
79	4.29207	4.954011
80	4.3464	5.01672
81	4.40073	5.079429
82	4.45506	5.142138
83	4.50939	5.204847
84	4.56372	5.267556
85	4.61805	5.330265
86	4.67238	5.392974
87	4.72671	5.455683
88	4.78104	5.518392
89	4.83537	5.581101
90	4.8897	5.64381

Conclusion

The study has express the different rate tensile strength generates modification from Metakaolin content, the materials has express various rate of its influence at different mix designed applied to

Table 3: Predictive and Experimental Value of Split Tensile Techniques at Different Curing Age.

Curing Age	Predictive Values of Split Tensile Strength of Concrete	Experimental Values on Split Tensile Strength of Concrete
7	0.27317927	0.326375203
8	0.31220488	0.373000232
9	0.35123049	0.419625261
10	0.3902561	0.46625029
11	0.42928171	0.512875319
12	0.46830732	0.559500348
13	0.50733293	0.606125377
14	0.54635854	0.652750406
15	0.58538415	0.699375435
16	0.62440976	0.746000464
17	0.66343537	0.792625493
18	0.70246098	0.839250522
19	0.74148659	0.885875551
20	0.7805122	0.93250058
21	0.81953781	0.979125609
22	0.85856342	1.025750638
23	0.89758903	1.072375667
24	0.93661464	1.119000696
25	0.97564025	1.165625725
26	1.01466586	1.212250754
27	1.05369147	1.258875783
28	1.09271708	1.305500812
29	1.13174269	1.352125841
30	1.1707683	1.39875087
31	1.20979391	1.445375899
32	1.24881952	1.492000928
33	1.28784513	1.538625957
34	1.32687074	1.585250986
35	1.36589635	1.631876015
36	1.40492196	1.678501044
37	1.44394757	1.725126073
38	1.48297318	1.771751102
39	1.52199879	1.818376131
40	1.5610244	1.86500116
41	1.60005001	1.911626189
42	1.63907562	1.958251218
43	1.67810123	2.004876247
44	1.71712684	2.051501276
45	1.75615245	2.098126305
46	1.79517806	2.144751334
47	1.83420367	2.191376363
48	1.87322928	2.238001392
49	1.91225489	2.284626421
50	1.9512805	2.33125145
51	1.99030611	2.377876479
52	2.02933172	2.424501508
53	2.06835733	2.471126537
54	2.10738294	2.517751566
55	2.14640855	2.564376595
56	2.18543416	2.611001624
57	2.22445977	2.657626653
58	2.26348538	2.704251682
59	2.30251099	2.750876711
60	2.3415366	2.79750174
61	2.38056221	2.844126769
62	2.41958782	2.890751798
63	2.45861343	2.937376827
64	2.49763904	2.984001856
65	2.53666465	3.030626885
66	2.57569026	3.077251914
67	2.61471587	3.123876943
68	2.65374148	3.170501972
69	2.69276709	3.217127001
70	2.7317927	3.26375203
71	2.77081831	3.310377059
72	2.80984392	3.357002088
73	2.84886953	3.403627117
74	2.88789514	3.450252146
75	2.92692075	3.496877175
76	2.96594636	3.543502204
77	3.00497197	3.590127233
78	3.04399758	3.636752262
79	3.08302319	3.683377291
80	3.1220488	3.73000232
81	3.16107441	3.776627349
82	3.20010002	3.823252378
83	3.23912563	3.869877407
84	3.27815124	3.916502436
85	3.31717685	3.963127465
86	3.35620246	4.009752494
87	3.39522807	4.056377523
88	3.43425368	4.103002552
89	3.47327929	4.149627581
90	3.5123049	4.19625261

Table 4: Predictive and Experimental Value of Split Tensile Techniques at Different Curing Age.

Curing Age	Predictive Values of Split Tensile Strength of Concrete	Experimental Values on Split Tensile Strength of Concrete
7	0.360968195	0.384203764
8	0.41253508	0.439090016
9	0.464101965	0.493976268
10	0.51566885	0.54886252
11	0.567235735	0.603748772
12	0.61880262	0.658635024
13	0.670369505	0.713521276
14	0.72193639	0.768407528
15	0.773503275	0.82329378
16	0.82507016	0.878180032
17	0.876637045	0.933066284
18	0.92820393	0.987952536
19	0.979770815	1.042838788
20	1.0313377	1.09772504
21	1.082904585	1.152611292
22	1.13447147	1.207497544
23	1.186038355	1.262383796
24	1.23760524	1.317270048
25	1.289172125	1.3721563
26	1.34073901	1.427042552
27	1.392305895	1.481928804
28	1.44387278	1.536815056
29	1.495439665	1.591701308
30	1.54700655	1.64658756
31	1.598573435	1.701473812
32	1.65014032	1.756360064
33	1.701707205	1.811246316
34	1.75327409	1.866132568
35	1.804840975	1.92101882

36	1.85640786	1.975905072
37	1.907974745	2.030791324
38	1.95954163	2.085677576
39	2.011108515	2.140563828
40	2.0626754	2.19545008
41	2.114242285	2.250336332
42	2.16580917	2.305222584
43	2.217376055	2.360108836
44	2.26894294	2.414995088
45	2.320509825	2.46988134
46	2.37207671	2.524767592
47	2.423643595	2.579653844
48	2.47521048	2.634540096
49	2.526777365	2.689426348
50	2.57834425	2.7443126
51	2.629911135	2.799198852
52	2.68147802	2.854085104
53	2.733044905	2.908971356
54	2.78461179	2.963857608
55	2.836178675	3.01874386
56	2.88774556	3.073630112
57	2.939312445	3.128516364
58	2.99087933	3.183402616
59	3.042446215	3.238288868
60	3.0940131	3.29317512
61	3.145579985	3.348061372
62	3.19714687	3.402947624
63	3.248713755	3.457833876
64	3.30028064	3.512720128
65	3.351847525	3.56760638
66	3.40341441	3.622492632
67	3.454981295	3.677378884
68	3.50654818	3.732265136
69	3.558115065	3.787151388
70	3.60968195	3.84203764
71	3.661248835	3.896923892
72	3.71281572	3.951810144
73	3.764382605	4.006696396
74	3.81594949	4.061582648
75	3.867516375	4.1164689
76	3.91908326	4.171355152
77	3.970650145	4.226241404
78	4.02221703	4.281127656
79	4.073783915	4.336013908
80	4.1253508	4.39090016
81	4.176917685	4.445786412
82	4.22848457	4.500672664
83	4.280051455	4.555558916
84	4.33161834	4.610445168
85	4.383185225	4.66533142
86	4.43475211	4.720217672
87	4.486318995	4.775103924
88	4.53788588	4.829990176
89	4.589452765	4.884876428
90	4.64101965	4.93976268

monitor the tensile strength of the materials. Linear trend were experienced from the figures to optimum values recorded at ninety days of curing age, the study has monitor the material based on the rate of the addictive reaction as partial replacement in concrete formation. Since one of the significant properties of concrete is

Table 5: Predictive and Experimental Value of Split Tensile Techniques at Different Curing Age.

Curing Age	Predictive Values of Split Tensile Strength of Concrete	Experimental Values on Split Tensile Strength of Concrete
7	0.411488728	0.429130191
8	0.470272832	0.490434504
9	0.529056936	0.551738817
10	0.58784104	0.61304313
11	0.646625144	0.674347443
12	0.705409248	0.735651756
13	0.764193352	0.796956069
14	0.822977456	0.858260382
15	0.88176156	0.919564695
16	0.940545664	0.980869008
17	0.999329768	1.042173321
18	1.058113872	1.103477634
19	1.116897976	1.164781947
20	1.17568208	1.22608626
21	1.234466184	1.287390573
22	1.293250288	1.348694886
23	1.352034392	1.409999199
24	1.410818496	1.471303512
25	1.4696026	1.532607825
26	1.528386704	1.593912138
27	1.587170808	1.655216451
28	1.645954912	1.716520764
29	1.704739016	1.777825077
30	1.76352312	1.83912939
31	1.822307224	1.900433703
32	1.881091328	1.961738016
33	1.939875432	2.023042329
34	1.998659536	2.084346642
35	2.05744364	2.145650955
36	2.116227744	2.206955268
37	2.175011848	2.268259581
38	2.233795952	2.329563894
39	2.292580056	2.390868207
40	2.35136416	2.45217252
41	2.410148264	2.513476833
42	2.468932368	2.574781146
43	2.527716472	2.636085459
44	2.586500576	2.697389772
45	2.64528468	2.758694085
46	2.704068784	2.819998398
47	2.762852888	2.881302711
48	2.821636992	2.942607024
49	2.880421096	3.003911337
50	2.9392052	3.06521565
51	2.997989304	3.126519963
52	3.056773408	3.187824276
53	3.115557512	3.249128589
54	3.174341616	3.310432902
55	3.23312572	3.371737215
56	3.291909824	3.433041528
57	3.350693928	3.494345841
58	3.409478032	3.555650154
59	3.468262136	3.616954467
60	3.52704624	3.67825878
61	3.585830344	3.739563093
62	3.644614448	3.800867406
63	3.703398552	3.862171719

64	3.762182656	3.923476032
65	3.82096676	3.984780345
66	3.879750864	4.046084658
67	3.938534968	4.107388971
68	3.997319072	4.168693284
69	4.056103176	4.229997597
70	4.11488728	4.29130191
71	4.173671384	4.352606223
72	4.232455488	4.413910536
73	4.291239592	4.475214849
74	4.350023696	4.536519162
75	4.4088078	4.597823475
76	4.467591904	4.659127788
77	4.526376008	4.720432101
78	4.585160112	4.781736414
79	4.643944216	4.843040727
80	4.70272832	4.90434504
81	4.761512424	4.965649353
82	4.820296528	5.026953666
83	4.879080632	5.088257979
84	4.937864736	5.149562292
85	4.99664884	5.210866605
86	5.055432944	5.272170918
87	5.114217048	5.333475231
88	5.173001152	5.394779544
89	5.231785256	5.456083857
90	5.29056936	5.51738817

Table 6: Predictive and Experimental Value of Split Tensile Techniques at Different Curing Age.

Curing Age	Predictive Values of Split Tensile Strength of Concrete	Experimental Values on Split Tensile Strength of Concrete
7	0.498495571	0.450800077
8	0.569709224	0.515200088
9	0.640922877	0.579600099
10	0.71213653	0.64400011
11	0.783350183	0.708400121
12	0.854563836	0.772800132
13	0.925777489	0.837200143
14	0.996991142	0.901600154
15	1.068204795	0.966000165
16	1.139418448	1.030400176
17	1.210632101	1.094800187
18	1.281845754	1.159200198
19	1.353059407	1.223600209
20	1.42427306	1.28800022
21	1.495486713	1.352400231
22	1.566700366	1.416800242
23	1.637914019	1.481200253
24	1.709127672	1.545600264
25	1.780341325	1.610000275
26	1.851554978	1.674400286
27	1.922768631	1.738800297
28	1.993982284	1.803200308
29	2.065195937	1.867600319
30	2.13640959	1.93200033
31	2.207623243	1.996400341
32	2.278836896	2.060800352
33	2.350050549	2.125200363
34	2.421264202	2.189600374
35	2.492477855	2.254000385
36	2.563691508	2.318400396
37	2.634905161	2.382800407
38	2.706118814	2.447200418
39	2.777332467	2.511600429
40	2.84854612	2.57600044
41	2.919759773	2.640400451
42	2.990973426	2.704800462
43	3.062187079	2.769200473
44	3.133400732	2.833600484
45	3.204614385	2.898000495
46	3.275828038	2.962400506
47	3.347041691	3.026800517
48	3.418255344	3.091200528
49	3.489468997	3.155600539
50	3.56068265	3.22000055
51	3.631896303	3.284400561
52	3.703109956	3.348800572
53	3.774323609	3.413200583
54	3.845537262	3.477600594
55	3.916750915	3.542000605
56	3.987964568	3.606400616
57	4.059178221	3.670800627
58	4.130391874	3.735200638
59	4.201605527	3.799600649
60	4.27281918	3.86400066
61	4.344032833	3.928400671
62	4.415246486	3.992800682
63	4.486460139	4.057200693
64	4.557673792	4.121600704
65	4.628887445	4.186000715
66	4.700101098	4.250400726
67	4.771314751	4.314800737
68	4.842528404	4.379200748
69	4.913742057	4.443600759
70	4.98495571	4.50800077
71	5.056169363	4.572400781
72	5.127383016	4.636800792
73	5.198596669	4.701200803
74	5.269810322	4.765600814
75	5.341023975	4.830000825
76	5.412237628	4.894400836
77	5.483451281	4.958800847
78	5.554664934	5.023200858
79	5.625878587	5.087600869
80	5.69709224	5.15200088
81	5.768305893	5.216400891
82	5.839519546	5.280800902
83	5.910733199	5.345200913
84	5.981946852	5.409600924
85	6.053160505	5.474000935
86	6.124374158	5.538400946
87	6.195587811	5.602800957
88	6.266801464	5.667200968
89	6.338015117	5.731600979
90	6.40922877	5.79600099

"tensile strength" as structural loads, it makes the concrete vulnerable to tensile cracking. It has been assessed that tensile strength of concrete are equal or roughly about ten percent of compressive strength. To determine the tensile strength, that is why indirect methods are applied due to its level of difficulty of the direct method, the study express the rate of tensile materials as it explained the significant role in concrete resistance to force or pull apart, the role of tensile has play it its fundamental state including its important properties, this has definitely affect the extent and size of cracking in structures. Moreover, the study observed different behavior of this material midfield with Metakaolin content, it has also express the rate at which concrete is very weak intension due to its brittle in nature. Tensile stress developed in the concrete at which the failure will occur is known as tensile strength of the material. So, concrete develops cracks when tensile forces exceed its tensile strength. Therefore, it is necessary to determine the tensile strength of concrete to monitor the load at which the concrete members may crack. The derived model predicts the behavior of the material considering these factors in the study.

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