

Electronic Supplementary Information

Modelling of Restrained Shrinkage Stresses in Mortar Using Artificial Neural Networks

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Table 1. Restrained Shrinkage Stresses as Calculated from Equation 9

S/No	Water Content	Cement content	Silica Fume	Super Plasticizer	SCA	Age	Restrained shrinkage Stresses
1	180	400	0	1.68	0	4	0.73613566
2	180	400	0	1.68	0	5	0.84275374
3	180	400	0	1.68	0	6	0.88366506
4	180	400	0	1.68	0	7	1.0709887
5	180	400	0	1.68	0	8	1.65943808
6	180	400	0	1.68	0	9	1.70027079
7	180	400	0	1.68	0	10	1.73481273
8	180	400	0	1.68	0	11	1.86881089
9	180	400	0	1.68	0	12	1.90634832
10	180	400	0	1.68	0	13	2.04703759
11	180	400	0	1.68	0	14	2.1709353
12	180	400	0	1.68	0	15	2.29232075
13	180	400	0	1.68	0	16	2.38147315
14	180	400	0	1.68	0	17	2.64787089
15	180	400	0	1.68	0	18	2.75409142
16	180	400	0	1.68	0	19	2.77014834
17	180	400	0	1.68	0	20	2.80566214
18	180	400	0	1.68	0	21	2.84444397
19	180	400	0	1.68	0	22	2.89410891
20	180	400	0	1.68	0	23	2.91665047
21	180	400	0	1.68	0	24	2.95742667

22	180	400	0	1.68	0	25	3.06701643
23	180	400	0	1.68	0	26	3.15346697
24	180	400	0	1.68	0	27	3.21742317
25	180	400	0	1.68	0	28	3.36877981
26	180	360	40	1.68	0	4	0.04480815
27	180	360	40	1.68	0	5	0.1255628
28	180	360	40	1.68	0	6	0.13620724
29	180	360	40	1.68	0	7	0.23607683
30	180	360	40	1.68	0	8	0.35649667
31	180	360	40	1.68	0	9	0.38926678
32	180	360	40	1.68	0	10	0.56255383
33	180	360	40	1.68	0	11	0.83018399
34	180	360	40	1.68	0	12	0.8618703
35	180	360	40	1.68	0	13	1.26741053
36	180	360	40	1.68	0	14	1.41064134
37	180	360	40	1.68	0	15	1.54141451
38	180	360	40	1.68	0	16	1.79852743
39	180	360	40	1.68	0	17	2.03173592
40	180	360	40	1.68	0	18	2.08903747
41	180	360	40	1.68	0	19	2.22972701
42	180	360	40	1.68	0	20	2.38637261
43	180	360	40	1.68	0	21	2.44068086
44	180	360	40	1.68	0	22	2.61854159
45	180	360	40	1.68	0	23	2.71467191
46	180	360	40	1.68	0	24	2.90356734
47	180	360	40	1.68	0	25	2.97106884
48	180	360	40	1.68	0	26	3.10374032
49	180	360	40	1.68	0	27	3.23415787
50	180	360	40	1.68	0	28	3.81892756
51	180	400	0	1.68	0	4	0.77873473
52	180	400	0	1.68	0.18	5	0.98398903
53	180	400	0	1.68	0.18	6	1.10800547
54	180	400	0	1.68	0.18	7	1.15266062

55	180	400	0	1.68	0.18	8	1.30956401
56	180	400	0	1.68	0.18	9	1.4665116
57	180	400	0	1.68	0.18	10	1.50485802
58	180	400	0	1.68	0.18	11	1.62027004
59	180	400	0	1.68	0.18	12	1.85903415
60	180	400	0	1.68	0.18	13	2.00054614
61	180	400	0	1.68	0.18	14	2.22245176
62	180	400	0	1.68	0.18	15	2.36678004
63	180	400	0	1.68	0.18	16	2.65812694
64	180	400	0	1.68	0.18	17	2.95200933
65	180	400	0	1.68	0.18	18	4.78810385
66	180	400	0	1.68	0.18	19	4.9462354
67	180	400	0	1.68	0.18	20	5.10102984
68	180	400	0	1.68	0.18	21	5.26524405
69	180	400	0	1.68	0.18	22	5.31471426
70	180	400	0	1.68	0.18	23	5.35920485
71	180	400	0	1.68	0.18	24	5.38695309
72	180	400	0	1.68	0.18	25	5.49190307
73	180	400	0	1.68	0.18	26	5.72064465
74	180	400	0	1.68	0.18	27	5.75806139
75	180	400	0	1.68	0.18	28	5.76571813
76	180	360	40	1.68	0.18	4	0.13959374
77	180	360	40	1.68	0.18	5	0.14554255
78	180	360	40	1.68	0.18	6	0.2705783
79	180	360	40	1.68	0.18	7	0.41103922
80	180	360	40	1.68	0.18	8	0.60092909
81	180	360	40	1.68	0.18	9	0.73758667
82	180	360	40	1.68	0.18	10	0.83361666
83	180	360	40	1.68	0.18	11	1.07637544
84	180	360	40	1.68	0.18	12	1.19301831
85	180	360	40	1.68	0.18	13	1.28201579
86	180	360	40	1.68	0.18	14	1.49470664
87	180	360	40	1.68	0.18	15	1.66694394

88	180	360	40	1.68	0.18	16	1.82544
89	180	360	40	1.68	0.18	17	1.92219779
90	180	360	40	1.68	0.18	18	2.54596167
91	180	360	40	1.68	0.18	19	2.67595519
92	180	360	40	1.68	0.18	20	2.72965706
93	180	360	40	1.68	0.18	21	2.85545833
94	180	360	40	1.68	0.18	22	2.91487156
95	180	360	40	1.68	0.18	23	3.29978878
96	180	360	40	1.68	0.18	24	3.4628278
97	180	360	40	1.68	0.18	25	3.63511796
98	180	360	40	1.68	0.18	26	3.74896585
99	180	360	40	1.68	0.18	27	3.87479036
100	180	360	40	1.68	0.18	28	4.38440812
101	185	336	0	1.4112	0	4	0.22009764
102	185	336	0	1.4112	0	5	0.41093374
103	185	336	0	1.4112	0	6	0.50697696
104	185	336	0	1.4112	0	7	0.59496167
105	185	336	0	1.4112	0	8	0.75750827
106	185	336	0	1.4112	0	9	1.004973
107	185	336	0	1.4112	0	10	1.11663223
108	185	336	0	1.4112	0	11	1.29857794
109	185	336	0	1.4112	0	12	1.47679929
110	185	336	0	1.4112	0	13	1.58740857
111	185	336	0	1.4112	0	14	1.73939363
112	185	336	0	1.4112	0	15	1.86270322
113	185	336	0	1.4112	0	16	2.04990824
114	185	336	0	1.4112	0	17	2.15269517
115	185	336	0	1.4112	0	18	2.42932374
116	185	336	0	1.4112	0	19	2.51304066
117	185	336	0	1.4112	0	20	2.62123204
118	185	336	0	1.4112	0	21	2.70741986
119	185	336	0	1.4112	0	22	2.85725277
120	185	336	0	1.4112	0	23	2.98518714

121	185	336	0	1.4112	0	24	3.07731928
122	185	336	0	1.4112	0	25	3.20640954
123	185	336	0	1.4112	0	26	3.31484112
124	185	336	0	1.4112	0	27	3.43109942
125	185	336	0	1.4112	0	28	3.58272309
126	185	336	0	1.4112	0.1512	4	0.19239531
127	185	336	0	1.4112	0.1512	5	0.32138852
128	185	336	0	1.4112	0.1512	6	0.48602471
129	185	336	0	1.4112	0.1512	7	0.67851327
130	185	336	0	1.4112	0.1512	8	0.83621168
131	185	336	0	1.4112	0.1512	9	1.051835
132	185	336	0	1.4112	0.1512	10	1.2408978
133	185	336	0	1.4112	0.1512	11	1.40874125
134	185	336	0	1.4112	0.1512	12	1.51533393
135	185	336	0	1.4112	0.1512	13	1.62752569
136	185	336	0	1.4112	0.1512	14	1.6510033
137	185	336	0	1.4112	0.1512	15	1.72763652
138	185	336	0	1.4112	0.1512	16	1.80263464
139	185	336	0	1.4112	0.1512	17	1.87238703
140	185	336	0	1.4112	0.1512	18	1.90476228
141	185	336	0	1.4112	0.1512	19	1.98932765
142	185	336	0	1.4112	0.1512	20	2.13782575
143	185	336	0	1.4112	0.1512	21	2.18525129
144	185	336	0	1.4112	0.1512	22	2.22509359
145	185	336	0	1.4112	0.1512	23	2.27399106
146	185	336	0	1.4112	0.1512	24	2.35074639
147	185	336	0	1.4112	0.1512	25	2.42923419
148	185	336	0	1.4112	0.1512	26	2.49396403
149	185	336	0	1.4112	0.1512	27	2.53330823
150	185	336	0	1.4112	0.1512	28	2.56677211
151	185	302.4	33.6	1.4112	0	4	0.05169319
152	185	302.4	33.6	1.4112	0	5	0.09263994
153	185	302.4	33.6	1.4112	0	6	0.18123854

154	185	302.4	33.6	1.4112	0	7	0.29921869
155	185	302.4	33.6	1.4112	0	8	0.48243276
156	185	302.4	33.6	1.4112	0	9	0.61212965
157	185	302.4	33.6	1.4112	0	10	0.75307051
158	185	302.4	33.6	1.4112	0	11	0.88492072
159	185	302.4	33.6	1.4112	0	12	1.06561772
160	185	302.4	33.6	1.4112	0	13	1.2749972
161	185	302.4	33.6	1.4112	0	14	1.3428305
162	185	302.4	33.6	1.4112	0	15	1.47750293
163	185	302.4	33.6	1.4112	0	16	1.6301136
164	185	302.4	33.6	1.4112	0	17	1.81918292
165	185	302.4	33.6	1.4112	0	18	1.93616562
166	185	302.4	33.6	1.4112	0	19	2.01024215
167	185	302.4	33.6	1.4112	0	20	2.06522549
168	185	302.4	33.6	1.4112	0	21	2.2010758
169	185	302.4	33.6	1.4112	0	22	2.39364833
170	185	302.4	33.6	1.4112	0	23	2.62376655
171	185	302.4	33.6	1.4112	0	24	2.84248422
172	185	302.4	33.6	1.4112	0	25	2.99812005
173	185	302.4	33.6	1.4112	0	26	3.14336002
174	185	302.4	33.6	1.4112	0	27	3.42611996
175	185	302.4	33.6	1.4112	0	28	3.6718996
176	185	302.4	33.6	1.4112	0.1512	4	0.07285784
177	185	302.4	33.6	1.4112	0.1512	5	0.25684709
178	185	302.4	33.6	1.4112	0.1512	6	0.36175473
179	185	302.4	33.6	1.4112	0.1512	7	0.5404956
180	185	302.4	33.6	1.4112	0.1512	8	0.69198748
181	185	302.4	33.6	1.4112	0.1512	9	0.69198748
182	185	302.4	33.6	1.4112	0.1512	10	0.83363248
183	185	302.4	33.6	1.4112	0.1512	11	0.83871703
184	185	302.4	33.6	1.4112	0.1512	12	0.93020021
185	185	302.4	33.6	1.4112	0.1512	13	1.07713312
186	185	302.4	33.6	1.4112	0.1512	14	1.2158205

187	185	302.4	33.6	1.4112	0.1512	15	1.37084587
188	185	302.4	33.6	1.4112	0.1512	16	1.54437099
189	185	302.4	33.6	1.4112	0.1512	17	1.69167036
190	185	302.4	33.6	1.4112	0.1512	18	1.98318103
191	185	302.4	33.6	1.4112	0.1512	19	2.14660875
192	185	302.4	33.6	1.4112	0.1512	20	2.31765354
193	185	302.4	33.6	1.4112	0.1512	21	2.45856496
194	185	302.4	33.6	1.4112	0.1512	22	2.62101948
195	185	302.4	33.6	1.4112	0.1512	23	2.72189081
196	185	302.4	33.6	1.4112	0.1512	24	2.72189081
197	185	302.4	33.6	1.4112	0.1512	25	2.84713006
198	185	302.4	33.6	1.4112	0.1512	26	2.90017284
199	185	302.4	33.6	1.4112	0.1512	27	2.90453828
200	185	302.4	33.6	1.4112	0.1512	28	2.999041
201	190	292	0	1.2264	0	4	0.13568386
202	190	292	0	1.2264	0	5	0.35281826
203	190	292	0	1.2264	0	6	0.59345847
204	190	292	0	1.2264	0	7	0.80856832
205	190	292	0	1.2264	0	8	1.06349721
206	190	292	0	1.2264	0	9	1.27399878
207	190	292	0	1.2264	0	10	1.50508712
208	190	292	0	1.2264	0	11	1.84692933
209	190	292	0	1.2264	0	12	2.12530405
210	190	292	0	1.2264	0	13	2.39055935
211	190	292	0	1.2264	0	14	2.66656431
212	190	292	0	1.2264	0	15	2.94478464
213	190	292	0	1.2264	0	16	3.23541433
214	190	292	0	1.2264	0	17	3.45088643
215	190	292	0	1.2264	0	18	3.60171602
216	190	292	0	1.2264	0	19	3.75415423
217	190	292	0	1.2264	0	20	4.02265518
218	190	292	0	1.2264	0	21	4.12758261
219	190	292	0	1.2264	0	22	4.3150285

220	190	292	0	1.2264	0	23	4.58620003
221	190	292	0	1.2264	0	24	4.76792733
222	190	292	0	1.2264	0	25	4.90305312
223	190	292	0	1.2264	0	26	5.11891513
224	190	292	0	1.2264	0	27	5.40594792
225	190	292	0	1.2264	0	28	5.46748046
226	190	292	0	1.2264	0.1314	4	0.20884888
227	190	292	0	1.2264	0.1314	5	0.34247801
228	190	292	0	1.2264	0.1314	6	0.47919461
229	190	292	0	1.2264	0.1314	7	0.61654925
230	190	292	0	1.2264	0.1314	8	0.7563723
231	190	292	0	1.2264	0.1314	9	0.83943094
232	190	292	0	1.2264	0.1314	10	0.9387306
233	190	292	0	1.2264	0.1314	11	1.05352357
234	190	292	0	1.2264	0.1314	12	1.16921214
235	190	292	0	1.2264	0.1314	13	1.18979174
236	190	292	0	1.2264	0.1314	14	1.28985861
237	190	292	0	1.2264	0.1314	15	1.45435238
238	190	292	0	1.2264	0.1314	16	1.53501979
239	190	292	0	1.2264	0.1314	17	1.61418925
240	190	292	0	1.2264	0.1314	18	1.68571505
241	190	292	0	1.2264	0.1314	19	1.80491272
242	190	292	0	1.2264	0.1314	20	1.86799888
243	190	292	0	1.2264	0.1314	21	1.94778632
244	190	292	0	1.2264	0.1314	22	2.1367785
245	190	292	0	1.2264	0.1314	23	2.27703226
246	190	292	0	1.2264	0.1314	24	2.40105203
247	190	292	0	1.2264	0.1314	25	2.59819444
248	190	292	0	1.2264	0.1314	26	2.73226002
249	190	292	0	1.2264	0.1314	27	2.92645188
250	190	292	0	1.2264	0.1314	28	3.10929131
251	190	262.8	29.2	1.2264	0	4	0.08260935

252	190	262.8	29.2	1.2264	0	5	0.1847118
253	190	262.8	29.2	1.2264	0	6	0.37640178
254	190	262.8	29.2	1.2264	0	7	0.50041704
255	190	262.8	29.2	1.2264	0	8	0.73784979
256	190	262.8	29.2	1.2264	0	9	0.89966214
257	190	262.8	29.2	1.2264	0	10	1.05358874
258	190	262.8	29.2	1.2264	0	11	1.25645692
259	190	262.8	29.2	1.2264	0	12	1.53145463
260	190	262.8	29.2	1.2264	0	13	1.6755987
261	190	262.8	29.2	1.2264	0	14	1.83447984
262	190	262.8	29.2	1.2264	0	15	1.98590403
263	190	262.8	29.2	1.2264	0	16	2.1265437
264	190	262.8	29.2	1.2264	0	17	2.21002312
265	190	262.8	29.2	1.2264	0	18	2.41643515
266	190	262.8	29.2	1.2264	0	19	2.6430208
267	190	262.8	29.2	1.2264	0	20	2.82213418
268	190	262.8	29.2	1.2264	0	21	2.93267203
269	190	262.8	29.2	1.2264	0	22	3.08980416
270	190	262.8	29.2	1.2264	0	23	3.21908754
271	190	262.8	29.2	1.2264	0	24	3.34243929
272	190	262.8	29.2	1.2264	0	25	3.45157964
273	190	262.8	29.2	1.2264	0	26	3.5675694
274	190	262.8	29.2	1.2264	0	27	3.62478116
275	190	262.8	29.2	1.2264	0	28	3.76400043
276	190	262.8	29.2	1.2264	0.1314	4	0.0495785
277	190	262.8	29.2	1.2264	0.1314	5	0.143469
278	190	262.8	29.2	1.2264	0.1314	6	0.2346993
279	190	262.8	29.2	1.2264	0.1314	7	0.2812396
280	190	262.8	29.2	1.2264	0.1314	8	0.3813351
281	190	262.8	29.2	1.2264	0.1314	9	0.4969928
282	190	262.8	29.2	1.2264	0.1314	10	0.6105958
283	190	262.8	29.2	1.2264	0.1314	11	0.7867043
284	190	262.8	29.2	1.2264	0.1314	12	0.9427022

285	190	262.8	29.2	1.2264	0.1314	13	<i>1.035575</i>
286	190	262.8	29.2	1.2264	0.1314	14	<i>1.1322118</i>
287	190	262.8	29.2	1.2264	0.1314	15	<i>1.234971</i>
288	190	262.8	29.2	1.2264	0.1314	16	<i>1.3642588</i>
289	190	262.8	29.2	1.2264	0.1314	17	<i>1.4555366</i>
290	190	262.8	29.2	1.2264	0.1314	18	<i>1.5141319</i>
291	190	262.8	29.2	1.2264	0.1314	19	<i>1.6231735</i>
292	190	262.8	29.2	1.2264	0.1314	20	<i>1.7110373</i>
293	190	262.8	29.2	1.2264	0.1314	21	<i>1.7999315</i>
294	190	262.8	29.2	1.2264	0.1314	22	<i>1.85343</i>
295	190	262.8	29.2	1.2264	0.1314	23	<i>1.9674703</i>
296	190	262.8	29.2	1.2264	0.1314	24	<i>2.0946025</i>
297	190	262.8	29.2	1.2264	0.1314	25	<i>2.2076955</i>
298	190	262.8	29.2	1.2264	0.1314	26	<i>2.2807577</i>
299	190	262.8	29.2	1.2264	0.1314	27	<i>2.344826</i>
300	190	262.8	29.2	1.2264	0.1314	28	<i>2.4643125</i>