Solução do Problema Bore3d - Solver HiGHS

Análise Computacional

17 de setembro de 2025

1 Informações do Problema

Informações do Problema:

- Nome: Bore3d

- Número de Variáveis: 315

- Número de Restrições: 233

- Inviabilidade Primal: 0.000e+00

- Inviabilidade Dual: 0.000e+00

- Valor Primal: 1.373e+03

- Valor Dual: 0.000e+00

- Gap: 0.000e+00

- Número de Iterações: 13

2 Variáveis Primais e Custos Reduzidos

Tabela 1: Variáveis primais e custos reduzidos do problema Bore3d

Coordenada x	Valor x	Coordenada z	Valor z
1	2.933389	1	0.000000
2	0.000000	2	3.580004
3	0.000000	3	79.665551
4	0.000000	4	2.932538
5	0.000000	5	17.115155
6	0.000000	6	52.352486
7	0.000000	7	47.095728
8	0.000000	8	45.748003
9	0.000000	9	14.379167
10	-0.000000	10	0.000000
11	0.000000	11	6.775586
12	0.000000	12	156.547731
		Continua na próxima página	

Coordenada x	Valor x	Coordenada z	Valor z
13	-0.000000	13	0.000000
14	0.000000	14	66.107936
15	0.000000	15	0.741987
16	0.000000	16	0.741987
17	0.000000	17	0.741987
18	0.837153	18	0.000000
19	0.000000	19	0.462267
20	-0.000000	20	0.000000
21	3.039205	21	0.000000
22	0.000000	22	0.962267
23	0.000000	23	1.270437
24	0.000000	24	0.962267
25	-0.000000	25	0.000000
26	0.000000	26	0.849419
27	-0.000000	27	0.000000
28	0.000000	28	0.449419
29	0.000000	29	0.849419
30	0.000000	30	1.270437
31	0.000000	31	0.962267
32	0.000000	32	1.270437
33	0.000000	33	0.962267
34	0.000000	34	0.000000
35	0.000000	35	0.849419
36	0.000000	36	0.000000
37	0.000000	37	0.562267
38	0.000000	38	0.449419
39	0.000000	39	0.849419
40	0.000000	40	1.270437
41	-0.000000	41	0.000000
42	0.000000	42	0.849419
43	0.000000	43	0.962267
44	0.000000	44	0.849419
45	0.000000	45	0.849419
46	0.000000	46	0.962267
47	0.000000	47	1.270437
48	0.000000	48	0.962267
49	0.000000	49	0.000000
50	0.000000	50	0.849419
51	0.000000	51	0.000000
52	0.000000	52	0.449419
53	0.000000	53	0.849419
54	0.000000	54	1.270437
55	3.205901	55	0.000000
56	-0.000000	56	0.000000
57	3.969979	57	0.000000
58	-0.000000	58	0.000000
59	-0.000000	59	0.000000
60	-0.000000	60	0.000000
61	1.960898	61	0.000000

Coordenada x	Valor x	Coordenada z	Valor z
62	0.520843	62	0.000000
63	0.371748	63	0.000000
64	0.121519	64	0.000000
65	0.797763	65	0.000000
66	1.795243	66	0.000000
67	17.932700	67	76.568525
68	56.773340	68	0.000000
69	0.000000	69	3.343130
70	0.000000	70	24.866370
71	0.000000	71	0.778048
72	0.000000	72	2.643360
73	0.000000	73	0.000000
74	19.344463	74	0.000000
75	10.203413	75	0.000000
76	0.000000	76	4.725750
77	0.000000	77	86.864470
78	0.000000	78	3.575350
79	0.000000	79	10.717770
80	503.420352	80	0.000000
81	0.535733	81	0.000000
82	0.000000	82	1.780870
83	0.000000	83	1.011030
84	0.440162	84	0.000000
85	0.319371	85	0.000000
86	-0.000000	86	0.000000
87	0.287886	87	0.000000
88	0.985911	88	0.000000
89	-0.000000	89	0.000000
90	-0.000000	90	0.000000
91	32.336302	91	0.000000
92	0.000000	92	2.058020
93	4.747126	93	0.000000
94	0.000000	94	2.754450
95	0.000000	95	1.546250
96	10.298765	96	0.000000
97	0.845831	97	0.000000
98	0.000000	98	32.446730
99	0.000000	99	13.816080
100	-0.000000	100	0.000000
101	0.000000	101	1.664440
102	0.000000	102	19.594330
103	0.000000	103	0.199630
104	0.000000	104	146.668310
105	0.000000	105	1.194120
106	7.921964	106	0.000000
107	5.997089	107	0.000000
108	6.208614	108	0.000000
109	2.308030	109	0.000000
110	9396.150372	110	0.000000

Coordenada x	Valor x	Coordenada z	Valor z
111	0.931478	111	0.000000
112	0.931478	112	0.000000
113	0.000000	113	4.257570
114	0.121519	114	0.000000
115	0.000000	115	7.643370
116	0.000000	116	6.198780
117	15.634575	117	0.000000
118	1.281618	118	0.000000
119	2.546298	119	0.000000
120	0.000000	120	3.694960
121	2.325330	121	0.000000
122	0.000000	122	8.897890
123	0.000000	123	2.724300
124	15.634575	124	0.000000
125	6.732262	125	0.000000
126	23.244416	126	0.000000
127	7.692093	127	0.000000
128	7.692093	128	0.000000
129	3.031797	129	0.000000
130	2.969688	130	0.000000
131	19.727943	131	0.000000
132	0.797763	132	0.000000
133	0.121206	133	0.000000
134	0.121206	134	0.000000
135	4.272765	135	0.000000
136	4.272765	136	0.000000
137	4.521412	137	0.000000
138	49.221721	138	0.000000
139	2.115247	139	0.000000
140	1.533149	140	0.000000
141	18.761490	141	0.000000
142	18.761490	142	0.000000
143	18.761490	143	0.000000
144	0.000000	144	0.202750
145	0.000000	145	21.073280
146	0.026787	146	0.000000
147	0.026787	147	0.000000
148	5.117079	148	0.000000
149	2.324967	149	0.000000
150	-0.000000	150	0.000000
151	1241.493374	151	0.000000
152	9.999721	152	0.000000
153	15.634575	153	0.000000
154	0.000000	154	0.000000
155	1.201003	155	0.000000
156	0.000000	156	35.326770
157	-0.000000	157	0.000000
158	0.000000	158	31.371918
159	0.000000	159	47.277335

Coordenada x	Valor x	Coordenada z	Valor z
160	0.000000	160	23.708368
161	0.000000	161	23.708368
162	1.971822	162	0.000000
163	0.000000	163	23.708368
164	0.000000	164	28.367520
165	-0.000000	165	0.000000
166	0.000000	166	20.144379
167	0.000000	167	134.987248
168	-0.000000	168	0.000000
169	0.770819	169	0.000000
170	0.000000	170	1.648751
171	1.533149	171	0.000000
172	0.440162	172	0.000000
173	0.319371	173	0.000000
174	0.000000	174	6.967806
175	0.000000	175	5.111010
176	-0.000000	176	0.000000
177	0.000000	177	10.188150
178	0.000000	178	10.513999
179	-0.000000	179	0.000000
180	0.770819	180	0.000000
181	0.000000	181	17.428863
182	0.000000	182	17.428863
183	0.000000	183	10.749122
184	0.000000	184	5.954782
185	0.000000	185	7.077889
186	-0.000000	186	0.000000
187	0.000000	187	32.971397
188	0.000000	188	30.343275
189	0.000000	189	25.269785
190	0.000000	190	26.894061
191	0.000000	191	4.414215
192	0.000000	192	27.152646
193	0.000000	193	5.110369
194	0.535733	194	0.000000
195	0.000000	195	2.620495
196	4.747126	196	0.000000
197	10.298765	197	0.000000
198	0.845831	198	0.000000
199	0.000000	199	335.354910
200	0.000000	200	335.354910
201	0.000000	201	309.642810
202	0.000000	202	335.354910
203	0.000000	203	335.354910
204	0.000000	204	300.092665
205	0.000000	205	300.410153
206	0.000000	206	335.354910
207	0.000000	207	17.428863
208	0.000000	208	17.428863

Coordenada x	Valor x	Coordenada z	Valor z
209	0.000000	209	3.411819
210	0.000000	210	3.318504
211	1.795243	211	0.000000
212	-0.000000	212	0.000000
213	0.000000	213	45.620943
214	2.298125	214	0.000000
215	2.115247	215	0.000000
216	0.000000	216	32.509610
217	1.154489	217	0.000000
218	0.541662	218	0.000000
219	0.373764	219	0.000000
220	0.238115	220	0.000000
221	0.931478	221	0.000000
222	15.634575	222	0.000000
223	-0.000000	223	0.000000
224	0.465493	224	0.000000
225	-0.000000	225	0.000000
226	-0.000000	226	0.000000
227	0.816125	227	0.000000
228	-0.000000	228	0.000000
229	0.000000	229	6.462930
230	2.546298	230	0.000000
231	2.325330	231	0.000000
232	15.634575	232	0.000000
233	6.732262	233	0.000000
234	7.692093	234	0.000000
235	0.000000	235	25.424373
236	0.000000	236	26.090680
237	-0.000000	237	0.000000
238	0.000000	238	25.602598
239	0.000000	239	10.825901
240	0.000000	240	13.816601
241	0.000000	241	35.043740
242	2.748184	242	0.000000
243	-0.000000	243	0.000000
244	0.000000	244	35.343839
245	1.795243	245	0.000000
246	17.932700	246	0.000000
247	0.121206	247	0.000000
248	4.272765	248	0.000000
249	0.000000	249	9.588415
250	0.000000	250	48.369403
251	0.000000	251	8.781494
252	2.115247	252	0.000000
253	0.000000	253	4.167868
254	0.000000	254	3.136162
255	18.761490	255	0.000000
256	0.026787	256	0.000000
257	5.117079	257	0.000000

Coordenada x	Valor x	Coordenada z	Valor z
258	1.937472	258	0.000000
259	7.692093	259	0.000000
260	0.000000	260	0.101670
261	8541.954884	261	0.000000
262	0.000000	262	0.095831
263	0.594041	263	0.000000
264	37.767015	264	0.000000
265	0.000000	265	0.265982
266	1.201003	266	0.000000
267	0.770819	267	0.000000
268	56.773340	268	0.000000
269	17.585875	269	0.000000
270	457.654866	270	0.000000
271	21.131288	271	0.000000
272	0.000000	272	0.367652
273	0.000000	273	0.170151
274	4696.454331	274	0.000000
275	40.636644	275	0.000000
276	0.000000	276	0.145495
277	4.042029	277	0.000000
278	2.146401	278	0.000000
279	0.000000	279	0.000000
280	7.226145	280	0.000000
281	397.960753	281	0.000000
282	8.177509	282	0.000000
283	7427.786856	283	0.000000
284	0.000000	284	0.195674
285	13.447165	285	0.000000
286	0.516557	286	0.000000
287	5295.531519	287	0.000000
288	0.000000	288	290.941372
289	0.000000	289	290.941372
290	0.000000	290	335.253240
291	0.000000	291	335.259079
292	0.000000	292	335.354910
293	0.000000	293	0.002099
294	0.000000	294	0.002841
295	0.000000	295	0.004440
296	1128.630340	296	0.000000
297	0.000000	297	0.009199
298	0.000000	298	0.002357
299	0.000000	299	0.003577
300	0.000000	300	0.004627
301	0.000000	301	0.000000
302	3.649869	302	0.000000
303	2.933389	303	0.000000
304	-0.000000	304	0.000000
305	-0.000000	305	0.000000
306	-0.000000	306	0.000000

Coordenada x	Valor x	Coordenada z	Valor z
307	-0.000000	307	0.000000
308	3.968214	308	0.000000
309	3.876358	309	0.000000
310	0.000000	310	0.000000
311	-0.000000	311	0.000000
312	0.000000	312	0.000000
313	-0.000000	313	0.000000
314	0.000000	314	0.000000
315	-0.000000	315	0.000000

3   Variáveis Duais (Multiplicadores de Lagrange)

Tabela 2: Variáveis duais do problema Bore3d

Coordenada y	Valor y
1	-0.000000
2	0.537609
3	-0.000000
4	-48.064153
5	-0.000000
6	-45.460728
7	-0.000000
8	-25.712100
9	-0.000000
10	-48.868632
11	-6.679740
12	-0.000000
13	-6.942783
14	-0.000000
15	-17.428863
16	-0.000000
17	-0.000000
18	-14.827470
19	-40.800278
20	-20.143219
21	0.232281
22	-0.000000
23	0.203781
24	0.158881
25	-22.206769
26	-22.206769
27	1.000000
28	-22.206769
29	-21.718084
30	1.000000
31	-33.076129

Coordenada y	Valor y
32	-22.206769
33	-24.828823
34	1.000000
35	1.000000
36	1.000000
37	1.000000
38	-25.577947
39	-25.540333
40	-2.483904
41	-25.264496
42	0.102181
43	-23.258411
44	0.149881
45	-0.000000
46	-0.000000
47	-18.025149
48	-23.891582
49	-35.013207
50	-0.000000
51	-0.000000
52	-23.708368
53	-0.000000
54	1.000000
55	1.000000
56	1.000000
57	-35.700520
58	-35.817686
59	-0.000000
60	-2.894557
61	0.350913
62	-6.462930
63	8.421764
64	-34.653507
65	0.479950
66	-37.882740
67	-26.079468
68	4.103958
69	-0.109367
70	-0.000000
71	-3.564502
72	-3.853227
73	-2.740047
74	-0.000000
75	-32.353571
76	-35.262245
77	-34.944757
78	-0.000000
79	-5.872819
80	-0.000000

Coordenada y	Valor y
81	33.426122
82	62.690155
83	-0.000000
84	-0.000000
85	10.000000
86	-0.000000
87	-0.000000
88	-0.000000
89	-0.000000
90	1.000000
91	-0.000000
92	-0.000000
93	1.000000
94	1.000000
95	1.000000
96	1.000000
97	2.299760
98	-0.000000
99	-0.000000
100	-0.388858
101	-0.000000
102	-0.000000
103	0.080310
104	1.259520
105	-0.000000
106	-0.000000
107	-0.000000
108	-0.000000
109	0.010640
110	11.326570
111	-0.000000
112	-0.000000
113	35.831790
114	8.100930
115	3.690670
116	2.610580
117	2.240910
118	52.422780
119	3.798870
120	0.247110
121	-0.000000
122	2.282470
123	-0.000000
124	-0.000000
125	0.531053
126	0.527360
127	40.544750
128	-0.000000
129	-0.000000

Coordenada y	Valor y
130	335.354910
131	-0.000000
132	-0.000000
133	-0.000000
134	-0.000000
135	-0.000000
136	0.485500
137	29.966800
138	0.182990
139	8.567920
140	0.003030
141	1.864440
142	0.640050
143	0.687790
144	-0.000000
145	36.700520
146	-0.000000
147	-0.000000
148	4.546150
149	10.350900
150	1.874730
151	-0.000000
152	3.839290
153	-0.000000
154	-0.000000
155	1.297847
156	1.252240
157	5.526210
158	0.127590
159	0.417980
160	0.145390
161	0.967670
162	7.027840
163	0.779730
164	0.520050
165	26.588996
166	6.720310
167	1.739730
168	1.219121
169	0.007410
170	0.604380
171	0.126710
172	0.072210
173	1.549990
174	2.743210
175	0.009070
176	1.624080
177	0.276410
178	-0.000000

Coordenada y	Valor y
179	-0.000000
180	158.465863
181	52.061340
182	2.131270
183	0.219510
184	0.376880
185	0.004080
186	0.000310
187	0.944430
188	-0.000000
189	-0.000000
190	0.353512
191	0.051223
192	0.371108
193	-22.206769
194	-22.206769
195	15.726689
196	0.003833
197	2.299760
198	-0.101670
199	-0.095831
200	-0.000000
201	0.307402
202	0.044542
203	0.285468
204	-0.101670
205	-0.000000
206	-0.095831
207	-0.000000
208	0.003485
209	0.116300
210	-0.000000
211	-0.000000
212	0.202389
213	0.312594
214	0.003833
215	-0.000000
216	-0.000000
217	-0.000000
218	-81.360246
219	-72.393613
220	-1.000000
221	-0.000000
222	-0.000000
223	-0.000000
224	-0.000000
225	-0.000000
226	-0.000000
227	-0.000000

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Coordenada y	Valor y
228	-0.000000
229	-0.000000
230	-0.000000
231	-0.000000
232	-0.000000
233	-0.000000

4 Observações

- O solver HiGHS foi configurado com o método IPM (Interior Point Method).

- Este arquivo contém a solução detalhada para o problema Bore3d.

- As variáveis duais representam os multiplicadores de Lagrange das restrições.

- Os custos reduzidos (z) indicam o impacto de forçar variáveis não-básicas na base.