Solução do Problema E226 - Solver HiGHS

Análise Computacional

16 de setembro de 2025

1 Informações do Problema

Informações do Problema:

- Nome: E226

- Número de Variáveis: 282

- Número de Restrições: 223

- Inviabilidade Primal: 0.000e+00

- Inviabilidade Dual: 0.000e+00

- Valor Primal: -1.164e+01

- Valor Dual: -1.875e+01

- Gap: -7.544e-17

- Número de Iterações: 22

2 Variáveis Primais e Custos Reduzidos

Tabela 1: Variáveis primais e custos reduzidos do problema E226

Coordenada x	Valor x	Coordenada z	Valor z
1	0.198400	1	0.000000
2	0.094914	2	0.000000
3	0.042500	3	0.000000
4	-0.000000	4	0.000000
5	0.213700	5	0.000000
6	-0.000000	6	0.000000
7	0.000000	7	0.053327
8	5.804967	8	0.000000
9	0.077500	9	0.000000
10	-0.000000	10	0.000000
11	0.011691	11	0.000000
12	-0.000000	12	0.000000
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Coordenada x	Valor x	Coordenada z	Valor z
13	0.000000	13	0.000000
14	0.000000	14	0.000000
15	0.000000	15	0.040661
16	-0.000000	16	0.000000
17	0.048700	17	0.000000
18	0.398700	18	0.000000
19	0.000000	19	0.000000
20	0.394298	20	0.000000
21	-0.000000	21	0.000000
22	10.609069	22	0.000000
23	0.158507	23	0.000000
24	3.965869	24	0.000000
25	1.964200	25	0.000000
26	0.960000	26	0.000000
27	2.908000	27	0.000000
28	1.785744	28	0.000000
29	0.101900	29	0.000000
30	0.604500	30	0.000000
31	1.264502	31	0.000000
32	0.000000	32	0.015900
33	9.721297	33	0.000000
34	1.500000	34	0.000000
35	0.052509	35	0.000000
36	0.000000	36	0.602809
37	0.134631	37	0.000000
38	0.420700	38	0.000000
39	0.666500	39	0.000000
40	0.000000	40	0.342824
41	0.050950	41	0.000000
42	-0.000000	42	0.000000
43	0.084140	43	0.000000
44	0.000000	44	21.083766
45	0.000000	45	0.000900
46	0.000000	46	0.464218
47	0.042900	47	0.000000
48	0.000000	48	1.000001
49	0.063026	49	0.000000
50	0.000000	50	0.747147
51	0.181467	51	0.000000
52	0.000000	52	0.014664
53	0.000000	53	1.017476
54	0.193800	54	0.000000
55	1.664155	55	0.000000
56	0.000000	56	0.505154
57	0.634400	57	0.000000
58	0.287405	58	0.000000
59	1.664155	59	0.000000
60	0.114025	60	0.000000
61	0.000000	61	0.065183

Coordenada x	Valor x	Coordenada z	Valor z
62	0.032700	62	0.000000
63	0.000000	63	0.063496
64	0.012175	64	0.000000
65	0.000000	65	1.354966
66	0.021927	66	0.000000
67	0.095644	67	0.000000
68	0.486617	68	0.000000
69	0.196840	69	0.000000
70	0.094240	70	0.000000
71	0.509843	71	0.000000
72	1.397079	72	0.000000
73	0.137500	73	0.000000
74	0.000000	74	0.016663
75	33.729741	75	0.000000
76	17.925548	76	0.000000
77	0.037231	77	0.000000
78	1.071848	78	0.000000
79	3.825400	79	0.000000
80	0.105540	80	0.000000
81	0.482722	81	0.000000
82	11.890517	82	0.000000
83	24.140813	83	0.000000
84	73.578691	84	0.000000
85	0.989237	85	0.000000
86	0.000000	86	0.029298
87	0.012768	87	0.000000
88	0.000000	88	0.147198
89	0.000000	89	0.165434
90	0.000000	90	0.055525
91	0.115321	91	0.000000
92	0.000000	92	0.000611
93	0.066308	93	0.000000
94	0.011633	94	0.000000
95	0.192670	95	0.000000
96	8.930719	96	0.000000
97	11.593384	97	0.000000
98	32.504647	98	0.000000
99	6.161009	99	0.000000
100	103.358563	100	0.000000
101	4.465359	101	0.000000
102	15.500737	102	0.000000
103	68.960403	103	0.000000
104	0.000000	104	0.547035
105	0.000000	105	1.101534
106	0.000000	106	0.652567
107	0.000000	107	0.471789
108	0.000000	108	0.246136
109	0.231400	109	0.000000
110	0.000000	110	0.116697

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Coordenada x	Valor x	Coordenada z	Valor z
111	0.000000	111	0.168707
112	3.692178	112	0.000000
113	0.347000	113	0.000000
114	0.000000	114	0.507366
115	0.316125	115	0.000000
116	0.000000	116	1.526642
117	0.000000	117	0.219013
118	0.000000	118	0.012867
119	0.000000	119	0.144680
120	0.000000	120	0.205088
121	0.000000	121	0.326914
122	0.000000	122	0.041259
123	0.000000	123	0.116910
124	0.000000	124	0.076329
125	0.184494	125	0.000000
126	0.217221	126	0.000000
127	0.005927	127	0.000000
128	0.000000	128	0.182128
129	0.049052	129	0.000000
130	0.526692	130	0.000000
131	0.000000	131	1.192148
132	0.000000	132	0.509772
133	-0.000000	133	0.000000
134	-0.000000	134	0.000000
135	0.295784	135	0.000000
136	0.000000	136	0.089737
137	0.000000	137	0.116750
138	0.000000	138	0.155310
139	0.000000	139	0.849098
140	-0.000000	140	0.000000
141	-0.000000	141	0.000000
142	0.512221	142	0.000000
143	0.039053	143	0.000000
144	0.000000	144	0.081692
145	0.000000	145	0.346060
146	0.000000	146	0.471580
147	0.000000	147	0.572950
148	0.000000	148	0.222635
149	0.000000	149	0.695305
150	0.000000	150	0.068928
151	0.486362	151	0.000000
152	0.000000	152	0.020251
153	0.045993	153	0.000000
154	0.665228	154	0.000000
155	0.057923	155	0.000000
156	0.493204	156	0.000000
157	0.000000	157	0.524949
158	0.624791	158	0.000000
159	0.037643	159	0.000000

Coordenada x	Valor x	Coordenada z	Valor z
160	0.000000	160	0.323525
161	0.000000	161	1.182221
162	0.000000	162	1.041402
163	0.000000	163	3.376052
164	0.592062	164	0.000000
165	1.269102	165	0.000000
166	1.293044	166	0.000000
167	0.399338	167	0.000000
168	0.000000	168	1.227601
169	0.000000	169	1.160544
170	0.000000	170	1.128382
171	0.000000	171	1.123762
172	0.000000	172	0.093136
173	0.000000	173	0.030778
174	1.332362	174	0.000000
175	0.000000	175	0.097655
176	0.000000	176	0.040252
177	0.000000	177	0.008130
178	0.000000	178	0.107839
179	0.000000	179	0.040782
180	0.000000	180	0.008620
181	0.000000	181	0.020257
182	0.158507	182	0.000000
183	0.011050	183	0.000000
184	0.000000	184	1.748607
185	0.000000	185	0.948309
186	0.011226	186	0.000000
187	0.151630	187	0.000000
188	0.324743	188	0.000000
189	-0.000000	189	0.000000
190	0.889438	190	0.000000
191	0.000000	191	0.068971
192	0.292288	192	0.000000
193	1.214262	193	0.000000
194	0.096922	194	0.000000
195	-0.000000	195	0.000000
196	0.000000	196	1.064250
197	0.000000	197	1.670284
198	0.000000	198	1.783148
199	0.000000	199	1.746538
200	0.000000	200	1.246240
201	0.189034	201	0.000000
202	0.000000	202	0.451678
203	0.000000	203	0.541604
204	0.000000	204	0.073508
205	0.048603	205	0.000000
206	0.000000	206	0.092874
207	0.000000	207	0.088101
208	0.000000	208	0.025493

Coordenada x	Valor x	Coordenada z	Valor z
209	0.000000	209	0.019227
210	0.094863	210	0.000000
211	0.251834	211	0.000000
212	0.266600	212	0.000000
213	0.000000	213	0.163468
214	0.000000	214	0.326936
215	0.000000	215	0.385278
216	0.109000	216	0.000000
217	0.000000	217	0.058668
218	0.000000	218	0.020914
219	0.000000	219	0.041289
220	0.198472	220	0.000000
221	0.000000	221	0.059583
222	0.000000	222	0.062383
223	0.017331	223	0.000000
224	0.000000	224	0.014342
225	0.000000	225	0.043485
226	0.000000	226	0.041289
227	0.000000	227	0.000253
228	0.900600	228	0.000000
229	0.000000	229	0.009781
230	0.000000	230	0.164954
231	0.000000	231	0.002215
232	0.690000	232	0.000000
233	0.000000	233	0.005712
234	0.000000	234	1.646439
235	1.060999	235	0.000000
236	0.000000	236	0.578087
237	0.000000	237	0.152050
238	0.000000	238	0.018856
239	0.000000	239	0.019811
240	0.000000	240	0.785681
241	0.000000	241	0.004566
242	1.253582	242	0.000000
243	0.000000	243	0.014664
244	0.000000	244	0.017811
245	0.000000	245	0.013711
246	0.000000	246	0.043340
247	0.000000	247	0.078833
248	0.000000	248	0.027825
249	0.000000	249	0.013704
250	0.000000	250	0.466655
251	3.032609	251	0.000000
252	1.217602	252	0.000000
253	0.509500	253	0.000000
254	0.000000	254	0.163676
255	0.000000	255	0.000507
256	2.736418	256	0.000000
257	0.000000	257	0.039888

Coordenada x	Valor x	Coordenada z	Valor z
258	0.000000	258	0.954980
259	1.587121	259	0.000000
260	0.529001	260	0.000000
261	0.000000	261	0.107206
262	2.264000	262	0.000000
263	0.000000	263	0.149534
264	0.000000	264	0.128231
265	0.000000	265	0.046305
266	0.000000	266	0.032169
267	0.000000	267	0.133017
268	0.629461	268	0.000000
269	0.000000	269	0.009234
270	0.000000	270	0.011456
271	4.283555	271	0.000000
272	0.000000	272	0.012209
273	0.000000	273	0.051193
274	0.000000	274	0.055430
275	0.456289	275	0.000000
276	0.000000	276	0.008284
277	0.000000	277	0.004822
278	0.440984	278	0.000000
279	0.000000	279	0.011870
280	0.000000	280	0.008956
281	0.000000	281	2.261901
282	-0.000000	282	0.000000

3 Variáveis Duais (Multiplicadores de Lagrange)

Tabela 2: Variáveis duais do problema E226

Coordenada y	Valor y
1	-0.000000
2	0.075425
3	-0.000000
4	-0.001877
5	0.060355
6	0.073959
7	-0.000000
8	-0.000000
9	-0.024008
10	-0.030148
11	-0.000000
12	-0.000000
13	-0.000000
14	-1.265782
15	-0.000000
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Coordenada y	Valor y
16	-3.642822
17	1.077690
18	-4.188474
19	1.077690
20	-0.000000
21	-0.000000
22	-4.942135
23	1.077690
24	-0.000000
25	-3.520825
26	-1.021774
27	-0.179992
28	-3.349533
29	-0.153485
30	-0.188541
31	-0.000000
32	-2.616915
33	-0.176713
34	-0.000000
35	-4.044125
36	-3.572371
37	-4.062266
38	-0.721433
39	-0.332151
40	-8.119518
41	-0.000000
42	-0.008700
43	-4.352551
44	-0.000000
45	-0.000000
46	-1.077690
47	-0.000000
48	-0.000000
49	-0.000000
50	-0.055091
51	-0.000000
52	-0.021160
53	-0.699520
54	-0.000000
55	-0.000000
56	-0.000000
57	-0.000000
58	-0.997782
59	-3.349533
60	-3.347400
61	-0.000000
62	-3.349533
63	-0.669967
64	-0.498960

Coordenada y	Valor y
65	-3.321240
66	-0.000000
67	-3.259707
68	-2.999304
69	-3.250400
70	-3.239509
71	-3.196583
72	-3.193067
73	-3.270528
74	-3.199887
75	-3.261883
76	-0.025271
77	-2.842827
78	-4.527362
79	-3.121126
80	-0.058001
81	-0.000000
82	-0.000000
83	-0.000000
84	-2.842827
85	0.228527
86	-0.025271
87	-1.505912
88	-1.646482
89	-1.207539
90	-0.229373
91	-0.000000
92	-0.000000
93	-1.513861
94	-0.000000
95	-0.672471
96	-1.474854
97	0.022002
98	0.002750
99	-2.294262
100	-1.907827
101	-1.428000
102	-0.000000
103	-1.620274
104	0.478753
105	-0.000000
106	-0.099021
107	0.002200
108	-0.014818
109	-0.007800
110	-0.000000
111	-0.000000
112	-0.000000
113	-0.000000

Coordenada y	Valor y
114	-0.000000
115	-0.000000
116	-2.149038
117	-2.261901
118	-2.294262
119	-0.091050
120	-1.513861
121	-0.000000
122	-1.284488
123	-0.000000
124	-0.000000
125	-1.172475
126	-0.000000
127	-0.000000
128	-0.004252
129	-0.000000
130	-2.385547
131	-2.494992
132	-3.494808
133	-0.000000
134	-0.000000
135	-0.000000
136	-0.000000
137	-0.000000
138	-0.004749
139	-0.101554
140	-0.003954
141	-0.000000
142	-2.359375
143	-2.988625
144	-0.003135
145	-0.000000
146	-0.000000
147	-0.000000
148	-0.000000
149	-0.000000
150	-0.068787
151	-0.002854
152	-0.000000
153	-1.949854
154	-2.499846
155	-0.000000
156	-0.000000
157	-0.000000
158	-0.000000
159	-0.000000
160	-0.000000
161	-0.013172
162	-0.005501

Coordenada y	Valor y
163	-0.000000
164	-0.061299
165	-0.000000
166	-0.000000
167	-0.000000
168	-0.000000
169	-0.000000
170	-0.000000
171	-0.219394
172	-1.886103
173	-1.878059
174	-1.884461
175	-1.901205
176	-2.825853
177	-2.976043
178	-3.097341
179	-3.229482
180	-2.293729
181	-0.001164
182	-0.001164
183	-0.000000
184	-2.293729
185	-0.000000
186	-2.526160
187	-0.000000
188	-10.320040
189	-0.077584
190	-10.119816
191	-29.116300
192	-0.019390
193	-1.513861
194	-2.526160
195	-1.844837
196	0.018339
197	-0.001521
198	-0.003393
199	-0.000000
200	-2.274223
201	-2.413761
202	-2.366125
203	-3.205716
204	-0.000000
205	-0.000000
206	-0.000000
207	-0.036346
208	-0.000000
209	0.012033
210	-0.012033
211	-0.000000

Coordenada y	Valor y
212	-0.000000
213	-0.000000
214	-0.407361
215	-0.000000
216	-0.536883
217	-0.000000
218	-0.000000
219	-0.098154
220	-1.377936
221	-3.520825
222	-3.014176
223	-2.241964

4   Observações

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

- Este arquivo contém a solução detalhada para o problema E226.

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

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