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>> demo_Polynomial_Dictionary_Learning
Starting to train the dictionary
solving the quadratic problem with YALMIP...
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num. of constraints = 45
dim. of socp var = 46, num. of socp blk = 1
dim. of linear var = 800
```

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*****
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SDPT3: Infeasible path-following algorithms
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```
version predcorr gam expon scale_data
HKM      1      0.000  1      0
it pstep dstep pinfeas dinfeas gap      prim-obj      dual-obj      cputime
-----
0|0.000|0.000|1.1e+00|1.4e+01|1.7e+06| 2.228445e+04  0.000000e+00| 0:0:00| chol 1✓
1
1|1.000|0.911|1.2e-05|1.4e+00|1.8e+05| 2.162502e+04 -7.354726e+01| 0:0:00| chol 1✓
1
2|0.787|0.950|4.0e-06|1.0e-01|4.4e+04| 2.803878e+04 -1.920430e+02| 0:0:00| chol 1✓
1
3|1.000|1.000|5.0e-07|1.0e-02|1.8e+04| 1.719314e+04 -2.007273e+02| 0:0:00| chol 1✓
1
4|0.973|1.000|8.7e-07|3.0e-03|5.0e+02| 3.018471e+02 -1.851985e+02| 0:0:00| chol 1✓
1
5|0.673|0.128|4.2e-06|2.6e-03|6.0e+02| 4.364239e+02 -1.515809e+02| 0:0:00| chol 1✓
1
6|0.094|0.122|3.4e-06|2.3e-03|5.9e+02| 3.082051e+02 -2.811575e+02| 0:0:00| chol 1✓
1
7|1.000|0.627|9.2e-08|8.7e-04|5.8e+02| 4.868101e+02 -8.687458e+01| 0:0:00| chol 1✓
1
8|0.927|1.000|7.3e-09|3.2e-07|9.2e+01| 1.618682e+01 -7.608674e+01| 0:0:00| chol 1✓
1
9|0.831|1.000|1.4e-09|3.1e-08|3.4e+01|-2.786193e+01 -6.228053e+01| 0:0:00| chol 1✓
1
10|1.000|1.000|7.0e-14|3.3e-09|1.3e+01|-4.077878e+01 -5.378454e+01| 0:0:00| chol 1✓
1
11|1.000|1.000|1.5e-14|3.0e-10|4.6e+00|-4.826593e+01 -5.291459e+01| 0:0:00| chol 1✓
1
12|1.000|1.000|9.6e-15|3.1e-11|2.0e+00|-4.996988e+01 -5.196953e+01| 0:0:00| chol 1✓
1
13|1.000|1.000|2.5e-14|4.0e-12|6.3e-01|-5.109061e+01 -5.171645e+01| 0:0:00| chol 1✓
1
14|1.000|1.000|7.9e-15|1.3e-12|2.6e-01|-5.135197e+01 -5.160816e+01| 0:0:00| chol 1✓
1
15|1.000|1.000|2.7e-14|1.0e-12|7.3e-02|-5.150022e+01 -5.157300e+01| 0:0:00| chol 1✓
1
16|1.000|1.000|1.6e-13|1.0e-12|3.0e-02|-5.153143e+01 -5.156124e+01| 0:0:00| chol 1✓
1
17|0.987|0.997|3.0e-14|1.0e-12|6.5e-03|-5.155043e+01 -5.155694e+01| 0:0:00| chol 1✓
1
18|0.678|1.000|1.3e-12|1.0e-12|3.9e-03|-5.155235e+01 -5.155624e+01| 0:0:00| chol 1✓
1
19|1.000|1.000|8.3e-12|1.0e-12|7.6e-04|-5.155509e+01 -5.155586e+01| 0:0:00| chol 1✓
2
```

```

20|1.000|1.000|1.4e-13|1.5e-12|2.0e-04|-5.155557e+01 -5.155577e+01| 0:0:00| chol 1✓
1
21|0.734|0.955|3.6e-11|1.1e-12|8.2e-05|-5.155567e+01 -5.155575e+01| 0:0:00| chol 1✓
1
22|0.928|1.000|4.9e-11|1.5e-12|2.4e-05|-5.155573e+01 -5.155575e+01| 0:0:00| chol 2✓
2
23|1.000|1.000|2.2e-12|2.3e-12|7.0e-06|-5.155574e+01 -5.155575e+01| 0:0:00|
stop: max(relative gap, infeasibilities) < 1.00e-07

```

```

-----
number of iterations    = 23
primal objective value = -5.15557420e+01
dual   objective value = -5.15557491e+01
gap := trace(XZ)       = 7.02e-06
relative gap           = 6.74e-08
actual relative gap    = 6.74e-08
rel. primal infeas     = 2.22e-12
rel. dual   infeas     = 2.25e-12
norm(X), norm(y), norm(Z) = 9.3e-01, 5.2e+01, 2.0e+01
norm(A), norm(b), norm(C) = 3.0e+02, 9.0e+00, 7.7e+01
Total CPU time (secs)   = 0.48
CPU time per iteration = 0.02
termination code        = 0
DIMACS errors: 4.7e-12  0.0e+00  3.2e-12  0.0e+00  6.7e-08  6.7e-08
-----

```

ans =

51.5557

```

num. of constraints = 45
dim. of socp var   = 46,   num. of socp blk = 1
dim. of linear var = 800
*****
SDPT3: Infeasible path-following algorithms
*****
version predcorr gam expon scale_data
HKM      1      0.000 1      0
it pstep dstep pinfeas dinfeas gap      prim-obj      dual-obj      cputime
-----
0|0.000|0.000|1.0e+00|2.6e+08|1.3e+15| 1.741607e+13  0.000000e+00| 0:0:00| chol 6✓
* 8
1|1.000|0.905|2.1e-07|2.5e+07|1.5e+14| 1.653852e+13  4.375060e+08| 0:0:00| chol 5✓
* 7
2|0.927|0.790|1.3e-08|5.2e+06|7.0e+13| 2.245492e+13 -6.838370e+10| 0:0:00| chol *
warning: symqmr failed: 2.0
switch to LU factor. lu 6 2
3|0.723|0.492|3.5e-09|2.7e+06|5.0e+13| 2.273913e+13 -1.028478e+11| 0:0:00| lu * 8✓
3
4|0.364|0.604|2.1e-08|1.0e+06|3.5e+13| 2.229800e+13 -1.392453e+11| 0:0:00| lu *10✓
4
5|0.454|0.425|2.4e-08|6.0e+05|2.7e+13| 2.010549e+13 -1.627734e+11| 0:0:00| lu *14✓
5
6|0.270|0.585|1.1e-07|2.5e+05|2.2e+13| 1.848173e+13 -1.446947e+11| 0:0:00| lu *13✓

```

```
4
7|0.331|0.266|7.3e-08|1.8e+05|1.9e+13| 1.653785e+13 -1.664829e+11| 0:0:00| 1u 26✓
12
8|0.102|0.507|2.4e-07|9.1e+04|1.7e+13| 1.607290e+13 -1.940229e+11| 0:0:00| 1u *13✓
6
9|0.267|0.216|2.7e-07|7.1e+04|1.6e+13| 1.511139e+13 -2.281033e+11| 0:0:00| 1u 30✓
30
10|0.025|0.055|8.0e-06|6.7e+04|1.6e+13| 1.507046e+13 -1.546440e+11| 0:0:00| 1u *26✓
9
11|0.047|0.084|8.4e-06|6.2e+04|1.6e+13| 1.486311e+13 -2.417488e+11| 0:0:00| 1u *18✓
11
12|0.280|0.426|8.5e-06|3.5e+04|1.5e+13| 1.446768e+13 -2.858644e+11| 0:0:00| 1u *22✓
5
13|0.238|0.529|6.3e-06|1.7e+04|1.3e+13| 1.228269e+13 -1.600838e+11| 0:0:00| 1u *16✓
3
14|0.681|0.790|2.0e-06|3.5e+03|4.9e+12| 4.682333e+12 -9.431527e+10| 0:0:00| 1u 30✓
5
15|0.117|0.337|1.8e-06|2.3e+03|4.8e+12| 4.515982e+12 -1.404336e+11| 0:0:00| 1u 30✓
5
16|0.160|0.240|1.4e-06|1.8e+03|4.6e+12| 4.247189e+12 -1.545782e+11| 0:0:00| 1u 13✓
^19
17|0.042|0.253|5.4e-05|1.3e+03|4.5e+12| 4.165141e+12 -1.344945e+11| 0:0:00| 1u 21✓
^20
18|0.237|0.365|2.2e-04|8.4e+02|4.3e+12| 3.953185e+12 -1.835097e+11| 0:0:00| 1u 30✓
11
19|0.133|0.489|1.9e-04|4.3e+02|4.0e+12| 3.712130e+12 -1.801861e+11| 0:0:00| 1u 30✓
7
20|0.196|0.379|1.5e-04|2.7e+02|3.7e+12| 3.351425e+12 -1.865412e+11| 0:0:00| 1u 17 ^✓
5
21|0.007|0.014|1.1e-04|2.6e+02|3.6e+12| 3.350703e+12 -1.438296e+11| 0:0:00| 1u 13✓
^18
22|0.013|0.013|1.6e-04|2.6e+02|3.6e+12| 3.337471e+12 -1.500877e+11| 0:0:00| 1u 30✓
30
23|0.021|0.029|9.0e-05|2.5e+02|3.6e+12| 3.321031e+12 -1.594318e+11| 0:0:00| 1u 30✓
22
24|0.040|0.279|1.3e-04|1.8e+02|3.6e+12| 3.291564e+12 -1.782356e+11| 0:0:00| 1u 30✓
^11
25|0.021|0.068|7.6e-05|1.7e+02|3.5e+12| 3.237462e+12 -1.071221e+11| 0:0:00| 1u 30✓
7
26|0.390|0.337|4.2e-05|1.1e+02|3.2e+12| 2.890094e+12 -1.525489e+11| 0:0:01| 1u 30 ^✓
8
27|0.120|0.491|3.7e-05|5.7e+01|3.0e+12| 2.710668e+12 -1.608573e+11| 0:0:01| 1u 25✓
23
28|0.193|0.160|8.8e-05|4.8e+01|2.8e+12| 2.460456e+12 -1.784717e+11| 0:0:01| 1u 18 ^✓
2
29|0.082|0.160|4.0e-05|4.0e+01|2.7e+12| 2.397623e+12 -1.828309e+11| 0:0:01| 1u 30 ^✓
6
30|0.065|0.316|8.3e-05|2.7e+01|2.7e+12| 2.356284e+12 -1.754720e+11| 0:0:01| 1u 30✓
30
31|0.014|0.025|8.4e-04|2.7e+01|2.7e+12| 2.324551e+12 -1.552170e+11| 0:0:01| 1u 30✓
9
32|0.273|0.405|6.6e-04|1.6e+01|2.3e+12| 1.983330e+12 -1.667765e+11| 0:0:01| 1u 19✓
30
33|0.022|0.047|1.2e-03|1.5e+01|2.3e+12| 1.990533e+12 -2.111028e+11| 0:0:01| 1u 28✓
```

```

8
34|0.142|0.505|5.9e-04|7.5e+00|2.1e+12| 1.835647e+12 -1.628970e+11| 0:0:01| 1u 30✓
30
35|0.392|0.241|9.1e-03|5.7e+00|2.0e+12| 1.589918e+12 -2.048961e+11| 0:0:01| 1u 21 ^✓
3
36|0.024|0.029|8.3e-03|5.5e+00|2.0e+12| 1.581547e+12 -2.077090e+11| 0:0:01| 1u 25✓
20
37|0.327|0.607|3.0e-02|2.2e+00|1.5e+12| 1.263106e+12 -1.149961e+11| 0:0:01| 1u 22✓
7
38|0.247|0.418|2.1e-02|1.3e+00|1.2e+12| 1.055053e+12 -1.073327e+11| 0:0:01| 1u 13✓
30
39|0.004|0.012|1.7e-02|1.3e+00|1.2e+12| 1.053617e+12 -1.043080e+11| 0:0:01| 1u 30✓
^12
40|0.062|0.023|4.6e-02|1.2e+00|1.2e+12| 1.031014e+12 -1.047633e+11| 0:0:01| 1u 17✓
30
41|0.001|0.017|4.6e-02|1.2e+00|1.2e+12| 1.031495e+12 -1.081946e+11| 0:0:01| 1u 12 ^✓
6
42|0.049|0.274|4.3e-02|8.7e-01|1.2e+12| 1.014403e+12 -1.117915e+11| 0:0:01| 1u 16✓
14
43|0.095|0.079|2.8e-02|8.0e-01|1.2e+12| 9.691828e+11 -1.112833e+11| 0:0:01| 1u 30✓
^25
44|0.031|0.212|4.8e-01|6.3e-01|1.1e+12| 9.599477e+11 -8.473746e+10| 0:0:01| 1u 15✓
14
45|0.100|0.213|4.9e-01|5.0e-01|1.1e+12| 9.002803e+11 -7.915358e+10| 0:0:01| 1u 28✓
^21
46|0.007|0.046|3.7e-01|4.7e-01|1.1e+12| 8.975002e+11 -9.460636e+10| 0:0:01| 1u 20✓
30
47|0.087|0.192|5.6e-01|3.8e-01|1.0e+12| 8.682383e+11 -8.745984e+10| 0:0:01| 1u 22✓
^20
48|0.060|0.276|1.8e-01|2.8e-01|1.0e+12| 8.519509e+11 -7.663323e+10| 0:0:01| 1u 30✓
14
49|0.073|0.259|1.2e-01|2.1e-01|9.6e+11| 8.240997e+11 -7.195802e+10| 0:0:01| 1u 12✓
30
50|0.007|0.036|5.9e-02|2.0e-01|9.5e+11| 8.220459e+11 -7.010646e+10| 0:0:01|
sqlp stop: maximum number of iterations reached

```

```

-----
number of iterations    = 50
primal objective value = 1.05505332e+12
dual   objective value = -1.07332709e+11
gap := trace(XZ)       = 1.25e+12
relative gap           = 1.07e+00
actual relative gap    = 1.00e+00
rel. primal infeas     = 2.09e-02
rel. dual   infeas     = 1.27e+00
norm(X), norm(y), norm(Z) = 4.3e+13, 1.1e+11, 1.5e+11
norm(A), norm(b), norm(C) = 6.2e+10, 7.2e+10, 7.7e+01
Total CPU time (secs)   = 1.05
CPU time per iteration = 0.02
termination code        = -6
DIMACS errors: 6.4e-02  0.0e+00  1.8e+00  0.0e+00  1.0e+00  1.1e+00
-----

```

ans =

5.2189e+12

Iteration 2 Total error is: 3.3415

num. of constraints = 45  
dim. of socp var = 46, num. of socp blk = 1  
dim. of linear var = 800

\*\*\*\*\*

SDPT3: Infeasible path-following algorithms

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version predcorr gam expon scale\_data

HKM 1 0.000 1 0

it pstep dstep pinfeas dinfeas gap prim-obj dual-obj cputime

it	pstep	dstep	pinfeas	dinfeas	gap	prim-obj	dual-obj	cputime			
0	0.000	0.000	1.0e+00	1.1e+06	3.0e+12	3.937502e+10	0.000000e+00	0:0:00	chol	3✓	
3	1	1.000	0.940	3.2e-07	6.5e+04	2.4e+11	3.738416e+10	-8.534334e+06	0:0:00	chol	4✓
4	2	0.386	0.791	2.0e-07	1.4e+04	1.0e+11	4.004367e+10	-1.148242e+08	0:0:00	chol	4✓
4	3	0.596	0.412	8.0e-08	8.0e+03	8.0e+10	3.955659e+10	-1.719035e+08	0:0:00	chol	5✓
5	4	0.202	0.513	6.3e-08	3.9e+03	6.1e+10	3.890137e+10	-2.883104e+08	0:0:00	chol	4✓
5	5	0.311	0.368	4.8e-08	2.4e+03	5.2e+10	3.683825e+10	-3.969615e+08	0:0:00	chol	7✓
6	6	0.160	0.608	5.0e-08	9.6e+02	4.2e+10	3.544288e+10	-5.230732e+08	0:0:00	chol	5✓
6	7	0.389	0.244	2.4e-08	7.3e+02	3.7e+10	3.170910e+10	-6.138150e+08	0:0:00	chol	*
										warning: symqmr failed: 2.0	
										switch to LU factor. lu 23 5	
8	0.133	0.841	4.2e-07	1.2e+02	3.2e+10	3.022446e+10	-3.056388e+08	0:0:00	lu	6✓	
2	9	0.082	0.222	3.7e-07	9.0e+01	3.1e+10	2.937782e+10	-4.458532e+08	0:0:00	lu	*11✓
3	10	0.110	0.058	3.2e-07	8.5e+01	3.0e+10	2.870096e+10	-4.872118e+08	0:0:00	lu	30✓
3	11	0.025	0.510	2.9e-07	4.2e+01	2.9e+10	2.841738e+10	-1.712517e+08	0:0:00	lu	7✓
2	12	0.082	0.161	2.5e-07	3.5e+01	2.8e+10	2.741216e+10	-2.886324e+08	0:0:00	lu	*13✓
3	13	0.066	0.069	3.5e-07	3.3e+01	2.8e+10	2.702517e+10	-3.374164e+08	0:0:00	lu	30✓
										^24	
14	0.005	0.014	4.1e-05	3.2e+01	2.8e+10	2.704732e+10	-2.767865e+08	0:0:00	lu	*16✓	
4	15	0.031	0.406	4.0e-05	1.9e+01	2.8e+10	2.675203e+10	-3.212548e+08	0:0:00	lu	30✓
4	16	0.101	0.066	3.5e-05	1.8e+01	2.7e+10	2.573135e+10	-3.747479e+08	0:0:00	lu	12✓
7	17	0.042	0.189	3.7e-05	1.4e+01	2.6e+10	2.547355e+10	-3.812729e+08	0:0:00	lu	30✓
9	18	0.082	0.082	1.1e-04	1.3e+01	2.6e+10	2.503965e+10	-4.129676e+08	0:0:00	lu	*16✓
4	19	0.028	0.093	9.8e-05	1.2e+01	2.6e+10	2.507208e+10	-5.801513e+08	0:0:00	lu	30✓

```
3
20|0.175|0.330|8.0e-05|8.0e+00|2.3e+10| 2.225769e+10 -5.156079e+08| 0:0:00| 1u *15✓
5
21|0.021|0.191|8.3e-05|6.5e+00|2.3e+10| 2.199591e+10 -5.279844e+08| 0:0:00| 1u *18✓
3
22|0.187|0.401|6.4e-05|3.9e+00|2.2e+10| 2.088281e+10 -5.660513e+08| 0:0:00| 1u 23✓
3
23|0.193|0.169|5.9e-05|3.2e+00|2.1e+10| 1.923314e+10 -7.003588e+08| 0:0:00| 1u 25✓
^28
24|0.131|0.154|7.3e-05|2.7e+00|2.0e+10| 1.860372e+10 -7.775813e+08| 0:0:00| 1u 12✓
7
25|0.107|0.244|5.0e-05|2.1e+00|2.0e+10| 1.814037e+10 -8.373811e+08| 0:0:00| 1u 30 ^✓
9
26|0.107|0.235|5.5e-05|1.6e+00|1.9e+10| 1.758165e+10 -8.820577e+08| 0:0:00| 1u 30✓
20
27|0.104|0.326|1.1e-04|1.1e+00|1.8e+10| 1.716843e+10 -5.244200e+08| 0:0:00| 1u 30✓
4
28|0.142|0.172|1.7e-04|8.8e-01|1.8e+10| 1.651325e+10 -7.871965e+08| 0:0:00| 1u 30✓
3
29|0.347|0.508|2.2e-04|4.4e-01|1.6e+10| 1.466910e+10 -7.076624e+08| 0:0:00| 1u 30✓
6
30|0.203|0.294|2.1e-04|3.1e-01|1.5e+10| 1.324351e+10 -8.058353e+08| 0:0:00| 1u 30✓
8
31|0.146|0.135|6.8e-04|2.7e-01|1.4e+10| 1.250989e+10 -8.552356e+08| 0:0:00| 1u 24✓
^11
32|0.100|0.164|7.5e-04|2.2e-01|1.4e+10| 1.224906e+10 -8.592999e+08| 0:0:01| 1u 30✓
30
33|0.044|0.055|5.4e-03|2.1e-01|1.4e+10| 1.209969e+10 -9.045164e+08| 0:0:01| 1u 30✓
5
34|0.032|0.174|4.4e-03|1.7e-01|1.4e+10| 1.207979e+10 -8.460208e+08| 0:0:01| 1u 30✓
4
35|0.440|0.419|1.6e-04|1.0e-01|9.4e+09| 8.199205e+09 -6.037391e+08| 0:0:01| 1u 27✓
7
36|0.037|0.353|1.1e-04|6.5e-02|9.1e+09| 8.061465e+09 -6.400158e+08| 0:0:01| 1u 22✓
11
37|0.231|0.210|3.6e-04|5.2e-02|8.6e+09| 7.488240e+09 -6.453506e+08| 0:0:01| 1u 30✓
24
38|0.112|0.482|4.0e-03|2.7e-02|8.2e+09| 7.356496e+09 -4.991059e+08| 0:0:01| 1u 30✓
6
39|0.155|0.454|2.7e-03|1.5e-02|7.8e+09| 6.999762e+09 -5.436411e+08| 0:0:01| 1u 30✓
9
40|0.310|0.334|3.5e-03|9.7e-03|7.4e+09| 6.570899e+09 -4.713384e+08| 0:0:01| 1u 30✓
6
41|0.132|0.439|3.2e-02|5.5e-03|7.3e+09| 6.268203e+09 -7.073591e+08| 0:0:01| 1u *16✓
4
42|0.582|1.000|7.9e-03|1.6e-04|6.1e+09| 5.486602e+09 -3.469311e+08| 0:0:01| 1u *17✓
3
43|0.706|1.000|1.2e-03|2.5e-04|5.0e+09| 4.092424e+09 -5.385809e+08| 0:0:01| 1u 9✓
3
44|1.000|1.000|2.1e-03|2.4e-04|3.0e+09| 2.367781e+09 -3.841651e+08| 0:0:01| 1u *13✓
2
45|1.000|1.000|7.6e-04|1.3e-04|1.0e+09| 7.904765e+08 -1.575073e+08| 0:0:01| 1u 10✓
3
46|1.000|1.000|7.7e-04|9.9e-05|5.3e+08| 3.927494e+08 -8.687745e+07| 0:0:01| 1u 14✓
```

```

2
47|1.000|1.000|1.4e-04|6.6e-05|2.5e+08| 1.835139e+08 -4.050405e+07| 0:0:01| lu 8✓
3
48|1.000|1.000|2.8e-05|2.8e-05|1.1e+08| 7.782208e+07 -2.144348e+07| 0:0:01| lu 7✓
2
49|1.000|1.000|2.0e-05|5.6e-06|4.6e+07| 3.597281e+07 -9.206482e+06| 0:0:01| lu 7✓
2
50|1.000|1.000|1.2e-05|4.0e-06|1.8e+07| 1.344712e+07 -4.332976e+06| 0:0:01|
  sqlp stop: maximum number of iterations reached
-----
number of iterations    = 50
primal objective value =  1.71684268e+10
dual   objective value = -5.24419964e+08
gap := trace(XZ)        = 1.85e+10
relative gap           = 1.04e+00
actual relative gap    = 1.00e+00
rel. primal infeas     = 1.13e-04
rel. dual   infeas     = 1.07e+00
norm(X), norm(y), norm(Z) = 1.4e+10, 5.2e+08, 7.4e+08
norm(A), norm(b), norm(C) = 1.7e+08, 8.2e+07, 7.7e+01
Total CPU time (secs)   = 0.78
CPU time per iteration = 0.02
termination code        = -6
DIMACS errors: 1.8e-04  0.0e+00  1.5e+00  0.0e+00  1.0e+00  1.0e+00
-----

ans =

    2.1640e+10

Iteration    3    Total error is: 0.20007

num. of constraints = 45
dim. of socp var   = 46,   num. of socp blk   = 1
dim. of linear var = 800
*****
SDPT3: Infeasible path-following algorithms
*****
version  predcorr  gam  expon  scale_data
HKM      1      0.000  1      0
it pstep dstep pinfeas dinfeas  gap      prim-obj      dual-obj      cputime
-----
0|0.000|0.000|1.0e+00|1.4e+04|6.8e+09| 8.785962e+07  0.000000e+00| 0:0:00| chol 2✓
2
1|1.000|0.969|8.1e-07|4.4e+02|3.6e+08| 8.321698e+07 -3.362490e+05| 0:0:00| chol 3✓
3
2|0.606|0.520|3.3e-07|2.1e+02|2.3e+08| 7.781063e+07 -5.078851e+05| 0:0:00| chol 4✓
4
3|0.274|0.509|2.4e-07|1.0e+02|1.6e+08| 7.810671e+07 -9.206635e+05| 0:0:00| chol 5✓
4
4|0.322|0.372|1.7e-07|6.5e+01|1.4e+08| 7.643395e+07 -1.272096e+06| 0:0:00| chol 5✓
5
5|0.186|0.604|2.6e-07|2.6e+01|1.0e+08| 7.413380e+07 -1.521122e+06| 0:0:00| chol 4✓
4

```

```

6|0.321|0.244|1.8e-07|1.9e+01|9.1e+07| 6.825870e+07 -1.821002e+06| 0:0:00| chol 5✓
4
7|0.084|0.660|4.0e-07|6.6e+00|7.6e+07| 6.614360e+07 -1.305118e+06| 0:0:00| chol 4✓
5
8|0.129|0.270|4.1e-07|4.8e+00|7.2e+07| 6.366112e+07 -1.863949e+06| 0:0:00| chol 4✓
5
9|0.148|0.285|4.4e-07|3.4e+00|6.8e+07| 6.002140e+07 -2.263122e+06| 0:0:00| chol 4✓
6
10|0.068|0.441|1.4e-06|1.9e+00|6.5e+07| 5.815864e+07 -2.226782e+06| 0:0:00| chol 5✓
5
11|0.147|0.218|2.6e-06|1.5e+00|6.3e+07| 5.533043e+07 -2.269113e+06| 0:0:00| chol 5✓
5
12|0.469|0.264|3.9e-06|1.1e+00|5.8e+07| 4.862237e+07 -3.228431e+06| 0:0:00| chol 4✓
5
13|0.083|0.381|4.1e-06|6.9e-01|5.5e+07| 4.656716e+07 -4.113662e+06| 0:0:00| chol 5✓
5
14|0.276|0.403|3.6e-06|4.1e-01|5.0e+07| 4.201151e+07 -3.887651e+06| 0:0:00| chol 5✓
5
15|0.221|0.214|3.3e-06|3.2e-01|4.7e+07| 3.808451e+07 -4.302987e+06| 0:0:00| chol 7✓
6
16|0.147|0.259|3.9e-06|2.4e-01|4.5e+07| 3.644464e+07 -4.340973e+06| 0:0:00| chol 7✓
6
17|0.133|0.192|4.2e-06|1.9e-01|4.3e+07| 3.459377e+07 -4.485681e+06| 0:0:00| chol 8✓
6
18|0.107|0.353|2.7e-06|1.2e-01|4.1e+07| 3.351910e+07 -4.107072e+06| 0:0:00| chol 6✓
5
19|0.161|0.132|6.9e-06|1.1e-01|3.9e+07| 3.134811e+07 -4.201542e+06| 0:0:00| chol 9✓
*11
20|0.071|0.179|5.1e-06|8.9e-02|3.8e+07| 3.060118e+07 -4.163553e+06| 0:0:00| chol *
warning: symqmr failed: 2.0
switch to LU factor. lu *15 3
21|0.162|0.182|2.0e-05|7.3e-02|3.7e+07| 2.947397e+07 -3.985402e+06| 0:0:00| lu 7✓
2
22|0.118|0.225|1.8e-05|5.6e-02|3.5e+07| 2.781131e+07 -4.028860e+06| 0:0:00| lu 5✓
2
23|0.223|0.437|8.2e-06|3.2e-02|3.1e+07| 2.559726e+07 -3.472364e+06| 0:0:00| lu 8✓
2
24|0.730|0.307|5.5e-05|2.2e-02|2.3e+07| 1.696397e+07 -3.803439e+06| 0:0:00| lu 7✓
2
25|0.536|0.424|8.5e-06|1.3e-02|2.0e+07| 1.485970e+07 -3.595680e+06| 0:0:00| lu 5✓
2
26|1.000|0.587|2.0e-05|5.2e-03|1.4e+07| 1.081420e+07 -2.887499e+06| 0:0:00| lu 4✓
1
27|0.928|1.000|5.4e-06|2.6e-06|7.5e+06| 5.154631e+06 -2.327028e+06| 0:0:00| lu 3✓
2
28|1.000|1.000|3.0e-06|1.1e-06|3.8e+06| 3.015464e+06 -7.601078e+05| 0:0:00| lu 3✓
1
29|0.969|1.000|1.6e-06|6.0e-07|1.0e+06| 7.364759e+05 -2.774214e+05| 0:0:00| lu 3✓
2
30|1.000|1.000|1.2e-07|3.2e-07|4.6e+05| 3.608529e+05 -1.038433e+05| 0:0:00| lu 3✓
1
31|1.000|1.000|7.8e-08|2.4e-08|1.4e+05| 9.838791e+04 -3.737978e+04| 0:0:00| lu 3✓
1
32|1.000|1.000|2.8e-08|1.6e-08|5.8e+04| 4.525505e+04 -1.319411e+04| 0:0:00| lu 3✓

```



```

1
33|1.000|1.000|2.8e-08|5.5e-09|1.8e+04| 1.272667e+04 -4.888633e+03| 0:0:00| 1u 3✓
1
34|1.000|1.000|8.0e-09|5.7e-09|7.4e+03| 5.739025e+03 -1.691755e+03| 0:0:00| 1u 3✓
1
35|1.000|1.000|1.1e-08|1.6e-09|2.2e+03| 1.591339e+03 -6.481811e+02| 0:0:00| 1u 3✓
1
36|1.000|1.000|6.3e-09|2.2e-09|9.5e+02| 7.007967e+02 -2.451179e+02| 0:0:00| 1u 3✓
1
37|1.000|1.000|2.5e-09|1.3e-09|2.8e+02| 1.641887e+02 -1.154761e+02| 0:0:00| 1u 3✓
1
38|1.000|1.000|1.9e-09|5.0e-10|1.2e+02| 5.200893e+01 -6.726410e+01| 0:0:00| 1u 3✓
1
39|1.000|1.000|6.8e-10|3.8e-10|3.3e+01|-1.837820e+01 -5.158350e+01| 0:0:00| 1u 3✓
1
40|1.000|1.000|3.1e-10|1.4e-10|1.5e+01|-3.181221e+01 -4.643477e+01| 0:0:00| 1u 3✓
1
41|0.996|1.000|3.3e-10|6.1e-11|3.7e+00|-4.097817e+01 -4.465768e+01| 0:0:00| 1u 3✓
1
42|1.000|1.000|2.0e-10|6.7e-11|1.7e+00|-4.250072e+01 -4.420583e+01| 0:0:00| 1u 3✓
1
43|0.969|1.000|2.0e-10|3.9e-11|3.7e-01|-4.364634e+01 -4.401922e+01| 0:0:00| 1u 4✓
1
44|1.000|1.000|4.8e-11|4.0e-11|1.7e-01|-4.381932e+01 -4.398931e+01| 0:0:00| 1u 3✓
1
45|0.972|1.000|1.1e-10|9.6e-12|3.5e-02|-4.393986e+01 -4.397466e+01| 0:0:00| 1u 3✓
1
46|1.000|1.000|2.7e-10|1.4e-11|1.5e-02|-4.395781e+01 -4.397281e+01| 0:0:00| 1u 4✓
1
47|0.971|0.981|2.2e-11|2.2e-11|2.3e-03|-4.396950e+01 -4.397180e+01| 0:0:00| 1u 29✓
3
48|0.843|0.946|4.1e-10|5.6e-12|9.7e-04|-4.397076e+01 -4.397176e+01| 0:0:00| 1u 14✓
30
49|0.633|0.622|1.2e-08|8.7e-12|4.0e-04|-4.397096e+01 -4.397173e+01| 0:0:00| 1u 30 ^✓
8
50|1.000|0.727|8.6e-09|1.2e-11|1.8e-04|-4.397122e+01 -4.397172e+01| 0:0:00|
  sqlp stop: maximum number of iterations reached
-----
number of iterations      = 50
primal objective value = -4.39712177e+01
dual   objective value = -4.39717236e+01
gap := trace(XZ)         = 1.79e-04
relative gap              = 2.02e-06
actual relative gap       = 5.69e-06
rel. primal infeas        = 8.64e-09
rel. dual   infeas        = 1.23e-11
norm(X), norm(y), norm(Z) = 4.2e+03, 5.9e+01, 2.3e+01
norm(A), norm(b), norm(C) = 2.1e+06, 1.9e+05, 7.7e+01
Total CPU time (secs)    = 0.36
CPU time per iteration   = 0.01
termination code         = -6
DIMACS errors: 1.4e-08  0.0e+00  1.8e-11  0.0e+00  5.7e-06  2.0e-06
-----

```

ans =

43.9717

Iteration 4 Total error is: 0.029314

num. of constraints = 45

dim. of socp var = 46, num. of socp blk = 1

dim. of linear var = 800

\*\*\*\*\*

SDPT3: Infeasible path-following algorithms

\*\*\*\*\*

version predcorr gam expon scale\_data

HKM 1 0.000 1 0

it pstep dstep pinfeas dinfeas gap prim-obj dual-obj cputime

```
-----
0|0.000|0.000|1.0e+00|4.8e+07|7.6e+13| 9.879413e+11 0.000000e+00| 0:0:00| chol 4✓
4
1|1.000|0.938|4.2e-07|2.9e+06|6.2e+12| 9.377689e+11 -6.790521e+08| 0:0:00| chol 6✓
5
2|0.341|0.770|2.7e-07|6.8e+05|2.7e+12| 9.992143e+11 -3.649870e+09| 0:0:00| chol 5✓
6
3|0.514|0.370|1.3e-07|4.3e+05|2.2e+12| 9.988378e+11 -5.568335e+09| 0:0:00| chol *
warning: symqmr failed: 2.0
switch to LU factor. lu * 9 2
4|0.176|0.550|1.1e-07|1.9e+05|1.6e+12| 9.920719e+11 -9.308548e+09| 0:0:00| lu * 8✓
2
5|0.355|0.312|7.7e-08|1.3e+05|1.4e+12| 9.374396e+11 -1.231707e+10| 0:0:00| lu *11✓
3
6|0.138|0.756|6.2e-08|3.2e+04|1.0e+12| 9.084390e+11 -1.378408e+10| 0:0:00| lu * 7✓
2
7|0.271|0.190|3.1e-08|2.6e+04|9.7e+11| 8.450118e+11 -1.642575e+10| 0:0:00| lu *15✓
3
8|0.319|0.639|5.2e-07|9.4e+03|7.8e+11| 7.202534e+11 -1.181066e+10| 0:0:00| lu *15✓
4
9|0.215|0.245|8.0e-07|7.1e+03|6.9e+11| 6.402071e+11 -1.233255e+10| 0:0:00| lu 30✓
10
10|0.097|0.326|8.7e-06|4.8e+03|6.6e+11| 6.236440e+11 -1.060791e+10| 0:0:00| lu 30✓
4
11|0.099|0.153|7.5e-06|4.1e+03|6.5e+11| 6.075023e+11 -1.200315e+10| 0:0:00| lu 30 ^✓
4
12|0.085|0.080|6.6e-06|3.7e+03|6.3e+11| 5.921759e+11 -1.317574e+10| 0:0:00| lu 15✓
28
13|0.062|0.078|7.4e-06|3.4e+03|6.3e+11| 5.846905e+11 -1.410147e+10| 0:0:00| lu 30✓
12
14|0.048|0.100|5.7e-06|3.1e+03|6.2e+11| 5.785724e+11 -1.483302e+10| 0:0:00| lu 12✓
30
15|0.048|0.346|6.6e-06|2.0e+03|6.1e+11| 5.731846e+11 -1.292014e+10| 0:0:00| lu 30✓
^14
16|0.086|0.080|5.3e-06|1.9e+03|6.0e+11| 5.629013e+11 -1.352337e+10| 0:0:00| lu 17✓
^14
17|0.033|0.046|1.2e-04|1.8e+03|6.0e+11| 5.604861e+11 -1.342277e+10| 0:0:00| lu 21✓
^28
18|0.002|0.013|1.9e-04|1.8e+03|6.0e+11| 5.593690e+11 -1.450821e+10| 0:0:00| lu 13✓
```

```
13
19|0.108|0.133|1.6e-04|1.5e+03|5.8e+11| 5.429184e+11 -1.588022e+10| 0:0:00| 1u 14✓
30
20|0.093|0.088|1.8e-04|1.4e+03|5.7e+11| 5.312156e+11 -1.691846e+10| 0:0:00| 1u 30✓
30
21|0.122|0.140|1.4e-04|1.2e+03|5.6e+11| 5.216618e+11 -1.922582e+10| 0:0:00| 1u 30✓
^20
22|0.103|0.191|4.8e-05|9.6e+02|5.5e+11| 5.083905e+11 -2.020048e+10| 0:0:00| 1u 16✓
^12
23|0.086|0.059|4.8e-04|9.1e+02|5.5e+11| 5.006125e+11 -1.892845e+10| 0:0:00| 1u 25✓
11
24|0.014|0.048|2.9e-04|8.6e+02|5.5e+11| 5.020348e+11 -2.561492e+10| 0:0:00| 1u 21✓
6
25|0.156|0.344|2.5e-04|5.7e+02|5.0e+11| 4.563432e+11 -2.054026e+10| 0:0:00| 1u 30✓
27
26|0.017|0.074|3.0e-04|5.2e+02|4.9e+11| 4.571283e+11 -1.290388e+10| 0:0:01| 1u 30✓
5
27|0.045|0.413|2.9e-04|3.1e+02|4.8e+11| 4.480044e+11 -1.885842e+10| 0:0:01| 1u 30✓
3
28|0.234|0.275|2.2e-04|2.2e+02|4.5e+11| 4.155440e+11 -1.948819e+10| 0:0:01| 1u 30✓
7
29|0.261|0.442|2.1e-04|1.2e+02|4.3e+11| 3.989979e+11 -1.573681e+10| 0:0:01| 1u *15✓
4
30|0.160|0.746|1.8e-04|3.2e+01|3.7e+11| 3.535501e+11 -8.612512e+09| 0:0:01| 1u 23✓
3
31|0.122|0.259|1.6e-04|2.3e+01|3.6e+11| 3.333992e+11 -1.334409e+10| 0:0:01| 1u 29✓
4
32|0.129|0.176|2.5e-04|1.9e+01|3.5e+11| 3.152703e+11 -1.569589e+10| 0:0:01| 1u 30✓
13
33|0.052|0.418|2.0e-04|1.1e+01|3.3e+11| 3.073981e+11 -1.534007e+10| 0:0:01| 1u 25✓
5
34|0.151|0.303|2.9e-04|7.8e+00|3.2e+11| 2.924060e+11 -1.563455e+10| 0:0:01| 1u 24✓
6
35|0.154|0.169|1.3e-03|6.5e+00|3.1e+11| 2.735760e+11 -1.881637e+10| 0:0:01| 1u 29✓
19
36|0.116|0.148|3.5e-03|5.6e+00|3.0e+11| 2.633232e+11 -2.088781e+10| 0:0:01| 1u 13✓
30
37|0.091|0.162|5.3e-05|4.7e+00|3.0e+11| 2.553843e+11 -2.254130e+10| 0:0:01| 1u 22 ^✓
6
38|0.046|0.059|1.5e-03|4.4e+00|3.0e+11| 2.515377e+11 -2.227652e+10| 0:0:01| 1u 12 ^✓
3
39|0.066|0.101|1.9e-02|3.9e+00|3.0e+11| 2.478029e+11 -2.549034e+10| 0:0:01| 1u 30 ^✓
7
40|0.023|0.046|2.5e-02|3.8e+00|2.9e+11| 2.440832e+11 -2.262635e+10| 0:0:01| 1u 30✓
8
41|0.062|0.188|2.5e-02|3.1e+00|2.9e+11| 2.433521e+11 -2.478082e+10| 0:0:01| 1u 30✓
5
42|0.154|0.551|2.6e-02|1.4e+00|2.5e+11| 2.199230e+11 -1.520476e+10| 0:0:01| 1u 30✓
5
43|0.112|0.281|2.4e-02|9.9e-01|2.4e+11| 2.081479e+11 -1.838783e+10| 0:0:01| 1u 25✓
4
44|0.142|0.178|1.2e-02|8.1e-01|2.3e+11| 1.949658e+11 -2.025795e+10| 0:0:01| 1u 30✓
^10
45|0.129|0.247|1.2e-02|6.1e-01|2.3e+11| 1.871121e+11 -2.138183e+10| 0:0:01| 1u 30✓
```

```

12
46|0.107|0.274|1.4e-02|4.4e-01|2.2e+11| 1.759602e+11 -2.107360e+10| 0:0:01| lu 21✓
^15
47|0.104|0.159|1.0e-01|3.7e-01|2.1e+11| 1.686043e+11 -2.165619e+10| 0:0:01| lu 12✓
^19
48|0.082|0.173|1.9e-01|3.1e-01|2.1e+11| 1.639510e+11 -2.218611e+10| 0:0:01| lu 12✓
^11
49|0.021|0.028|3.1e-01|3.0e-01|2.0e+11| 1.626269e+11 -2.240339e+10| 0:0:01| lu 26✓
^28
50|0.044|0.210|3.0e-01|2.4e-01|2.0e+11| 1.601004e+11 -2.227357e+10| 0:0:01|
  sqlp stop: maximum number of iterations reached
-----
number of iterations      = 50
primal objective value =  2.08147902e+11
dual   objective value = -1.83878311e+10
gap := trace(XZ)         = 2.44e+11
relative gap              = 1.08e+00
actual relative gap       = 1.00e+00
rel. primal infeas        = 2.36e-02
rel. dual   infeas        = 9.86e-01
norm(X), norm(y), norm(Z) = 2.0e+12, 1.8e+10, 2.6e+10
norm(A), norm(b), norm(C) = 7.5e+09, 1.7e+09, 7.7e+01
Total CPU time (secs)    = 0.93
CPU time per iteration   = 0.02
termination code         = -6
DIMACS errors: 3.0e-02  0.0e+00  1.4e+00  0.0e+00  1.0e+00  1.1e+00
-----

ans =

    7.0324e+11

Iteration    5    Total error is: 1.0689

num. of constraints = 45
dim. of socp  var = 46,    num. of socp blk = 1
dim. of linear var = 800
*****
SDPT3: Infeasible path-following algorithms
*****
version predcorr gam expon scale_data
  HKM      1      0.000  1      0
it pstep dstep pinfeas dinfeas gap      prim-obj      dual-obj      cputime
-----
0|0.000|0.000|1.0e+00|3.7e+04|9.3e+09| 1.195650e+08  0.000000e+00| 0:0:00| chol  2✓
2
1|1.000|0.977|9.2e-07|8.4e+02|4.2e+08| 1.131238e+08 -9.475879e+05| 0:0:00| chol  3✓
3
2|0.755|0.487|2.3e-07|4.3e+02|2.5e+08| 9.275539e+07 -1.088016e+06| 0:0:00| chol  3✓
3
3|0.341|0.547|1.5e-07|2.0e+02|1.8e+08| 8.971023e+07 -1.444971e+06| 0:0:00| chol  4✓
4
4|0.332|0.354|9.8e-08|1.3e+02|1.5e+08| 8.498604e+07 -1.803579e+06| 0:0:00| chol  4✓
5

```

```

5|0.175|0.542|8.1e-08|5.8e+01|1.1e+08| 8.197854e+07 -1.930533e+06| 0:0:00| chol 4✓
5
6|0.279|0.238|5.7e-08|4.4e+01|1.0e+08| 7.583093e+07 -2.309600e+06| 0:0:00| chol 6✓
5
7|0.071|0.647|5.3e-08|1.6e+01|8.6e+07| 7.369425e+07 -2.470066e+06| 0:0:00| chol 4✓
4
8|0.198|0.182|4.3e-08|1.3e+01|8.2e+07| 6.946006e+07 -2.943549e+06| 0:0:00| chol 5✓
5
9|0.043|0.154|5.8e-08|1.1e+01|8.0e+07| 6.768606e+07 -1.559752e+06| 0:0:00| chol 4✓
4
10|0.386|0.316|6.8e-08|7.4e+00|7.3e+07| 6.178012e+07 -2.921695e+06| 0:0:00| chol 4✓
4
11|0.152|0.663|6.8e-08|2.5e+00|6.3e+07| 5.695891e+07 -2.331860e+06| 0:0:00| chol 4✓
4
12|0.137|0.296|7.5e-08|1.7e+00|6.0e+07| 5.342844e+07 -2.826822e+06| 0:0:00| chol 5✓
4
13|0.108|0.161|6.9e-08|1.5e+00|5.9e+07| 5.125873e+07 -3.151115e+06| 0:0:00| chol 7✓
7
14|0.059|0.152|1.3e-07|1.2e+00|5.7e+07| 5.008633e+07 -2.554978e+06| 0:0:00| chol 4✓
5
15|0.099|0.192|3.3e-07|1.0e+00|5.6e+07| 4.879649e+07 -3.389054e+06| 0:0:00| chol 5✓
5
16|0.105|0.306|4.6e-07|7.0e-01|5.3e+07| 4.620974e+07 -3.316883e+06| 0:0:00| chol 7✓
6
17|0.062|0.275|4.0e-07|5.1e-01|5.2e+07| 4.491556e+07 -3.524762e+06| 0:0:00| chol 5✓
6
18|0.107|0.152|2.2e-07|4.3e-01|5.1e+07| 4.304519e+07 -3.748500e+06| 0:0:00| chol 10✓
7
19|0.091|0.236|5.4e-07|3.3e-01|5.0e+07| 4.182008e+07 -3.880941e+06| 0:0:00| chol 8✓
7
20|0.101|0.165|4.1e-07|2.7e-01|4.8e+07| 3.969201e+07 -3.980802e+06| 0:0:00| chol 20✓
12
21|0.066|0.190|3.7e-06|2.2e-01|4.7e+07| 3.869173e+07 -4.198100e+06| 0:0:00| chol 9✓
13
22|0.096|0.298|1.5e-05|1.6e-01|4.5e+07| 3.751857e+07 -3.582406e+06| 0:0:00| chol 5✓
7
23|0.095|0.174|1.9e-05|1.3e-01|4.4e+07| 3.603801e+07 -3.873332e+06| 0:0:00| chol 5✓
6
24|0.160|0.352|1.7e-05|8.3e-02|4.1e+07| 3.397211e+07 -3.852504e+06| 0:0:00| chol 7✓
7
25|0.173|0.157|1.1e-05|7.0e-02|3.8e+07| 3.105270e+07 -4.185925e+06| 0:0:00| chol *
warning: symqmr failed: 2.0
switch to LU factor. lu 27 3
26|0.125|0.087|2.6e-05|6.4e-02|3.7e+07| 2.971879e+07 -4.385377e+06| 0:0:00| lu 24✓
^16
27|0.104|0.109|1.8e-04|5.7e-02|3.7e+07| 2.894088e+07 -4.552158e+06| 0:0:00| lu 21 ^✓
5
28|0.072|0.115|2.1e-04|5.1e-02|3.6e+07| 2.820249e+07 -4.672259e+06| 0:0:00| lu 30✓
4
29|0.117|0.173|8.5e-04|4.2e-02|3.5e+07| 2.762103e+07 -4.038235e+06| 0:0:00| lu *13✓
3
30|0.232|0.176|1.2e-03|3.4e-02|2.9e+07| 2.249077e+07 -4.533464e+06| 0:0:00| lu 6✓
2
31|1.000|0.834|9.0e-05|5.7e-03|1.7e+07| 1.460153e+07 -2.082760e+06| 0:0:00| lu 4✓

```

```

2
32|0.886|1.000|1.8e-05|7.1e-06|9.6e+06| 5.844834e+06 -3.796440e+06| 0:0:00| 1u 4✓
2
33|1.000|0.650|1.0e-05|6.2e-06|7.0e+06| 6.507172e+06 -5.082053e+05| 0:0:00| 1u 4✓
2
34|0.925|1.000|1.0e-06|2.0e-06|6.6e+05| 4.340193e+05 -2.207352e+05| 0:0:00| 1u 3✓
1
35|0.780|1.000|1.3e-07|2.1e-07|3.6e+05| 2.396701e+05 -1.209040e+05| 0:0:00| 1u 3✓
1
36|1.000|1.000|2.8e-08|2.6e-08|1.6e+05| 1.254926e+05 -3.194879e+04| 0:0:00| 1u 3✓
1
37|0.881|1.000|2.6e-08|5.6e-09|4.2e+04| 3.035496e+04 -1.211620e+04| 0:0:00| 1u 2✓
1
38|1.000|1.000|8.8e-09|5.1e-09|1.9e+04| 1.498283e+04 -4.208511e+03| 0:0:00| 1u 3✓
1
39|0.985|1.000|4.0e-09|1.8e-09|5.2e+03| 3.727293e+03 -1.516680e+03| 0:0:00| 1u 3✓
1
40|1.000|1.000|2.5e-09|8.0e-10|2.4e+03| 1.814538e+03 -5.699583e+02| 0:0:00| 1u 3✓
1
41|1.000|1.000|1.5e-09|5.1e-10|6.9e+02| 4.611843e+02 -2.261666e+02| 0:0:00| 1u 3✓
1
42|1.000|1.000|7.4e-10|2.9e-10|3.0e+02| 1.909391e+02 -1.066477e+02| 0:0:00| 1u 3✓
1
43|1.000|1.000|4.7e-10|1.5e-10|8.5e+01| 1.965878e+01 -6.563994e+01| 0:0:00| 1u 3✓
1
44|1.000|1.000|5.4e-10|9.3e-11|3.7e+01|-1.457501e+01 -5.144126e+01| 0:0:00| 1u 3✓
1
45|1.000|1.000|2.2e-10|1.1e-10|1.0e+01|-3.661599e+01 -4.661883e+01| 0:0:00| 1u 3✓
1
46|1.000|1.000|4.4e-11|4.4e-11|4.5e+00|-4.064752e+01 -4.512995e+01| 0:0:00| 1u 3✓
1
47|0.993|1.000|8.2e-11|8.9e-12|1.1e+00|-4.346707e+01 -4.458510e+01| 0:0:00| 1u 3✓
1
48|1.000|1.000|1.1e-10|1.3e-11|5.2e-01|-4.393179e+01 -4.444988e+01| 0:0:00| 1u 3✓
1
49|0.977|1.000|2.5e-11|2.0e-11|1.2e-01|-4.427475e+01 -4.439299e+01| 0:0:00| 1u 4✓
1
50|1.000|1.000|3.4e-10|5.1e-12|5.4e-02|-4.432905e+01 -4.438308e+01| 0:0:00|
  sqlp stop: maximum number of iterations reached
-----
number of iterations      = 50
primal objective value = -4.43290480e+01
dual   objective value = -4.43830820e+01
gap := trace(XZ)         = 5.40e-02
relative gap              = 6.02e-04
actual relative gap       = 6.02e-04
rel. primal infeas        = 3.38e-10
rel. dual   infeas        = 5.05e-12
norm(X), norm(y), norm(Z) = 1.3e+04, 5.9e+01, 2.3e+01
norm(A), norm(b), norm(C) = 5.7e+06, 3.0e+05, 7.7e+01
Total CPU time (secs)    = 0.43
CPU time per iteration   = 0.01
termination code          = -6
DIMACS errors: 6.4e-10  0.0e+00  7.2e-12  0.0e+00  6.0e-04  6.0e-04

```

44.3813

```
num. of constraints = 45
dim. of socp var = 46,    num. of socp blk = 1
dim. of linear var = 800
```

version	predcorr	gam	expon	scale_data
HKM	1	0.000	1	0

it	pstep	dstep	pinfeas	dinfeas	gap	prim-obj	dual-obj	cputime			
4	0	0.000	0.000	1.0e+00	3.9e+07	1.5e+13	1.951736e+11	0.000000e+00	0:0:00	chol	5✓
6	1	1.000	0.967	4.3e-07	1.3e+06	8.4e+11	1.848156e+11	-9.388608e+08	0:0:00	chol	6✓
* 9	2	0.626	0.516	1.6e-07	6.4e+05	5.3e+11	1.759056e+11	-1.320775e+09	0:0:00	chol	6✓
	3	0.266	0.529	1.2e-07	3.0e+05	3.7e+11	1.770689e+11	-2.324835e+09	0:0:00	chol	*
		warning: symqmr failed: 2.0 switch to LU factor. lu 6 2									
3	4	0.340	0.345	8.0e-08	2.0e+05	3.1e+11	1.730640e+11	-3.135118e+09	0:0:00	lu	*11✓
	5	0.168	0.633	8.9e-08	7.2e+04	2.3e+11	1.685692e+11	-3.538138e+09	0:0:00	lu	8✓
4	6	0.274	0.243	5.7e-08	5.5e+04	2.1e+11	1.576478e+11	-4.297020e+09	0:0:00	lu	21✓
2	7	0.092	0.746	7.0e-07	1.4e+04	1.7e+11	1.516671e+11	-2.315191e+09	0:0:00	lu	6✓
	8	0.108	0.231	5.3e-07	1.1e+04	1.6e+11	1.465805e+11	-3.664190e+09	0:0:00	lu	*12✓
5	9	0.149	0.159	3.1e-07	9.0e+03	1.6e+11	1.383049e+11	-4.447362e+09	0:0:00	lu	30✓
3	10	0.062	0.521	6.5e-07	4.3e+03	1.5e+11	1.342654e+11	-3.426313e+09	0:0:00	lu	*12✓
	11	0.122	0.183	5.3e-07	3.5e+03	1.4e+11	1.281034e+11	-4.864575e+09	0:0:00	lu	30✓
6	12	0.100	0.251	1.1e-06	2.6e+03	1.4e+11	1.240078e+11	-5.508778e+09	0:0:00	lu	30✓
4	13	0.101	0.342	3.2e-06	1.7e+03	1.3e+11	1.196781e+11	-4.149888e+09	0:0:00	lu	30✓
4	14	0.187	0.153	4.0e-06	1.5e+03	1.3e+11	1.120357e+11	-5.643681e+09	0:0:00	lu	30✓
4	15	0.322	0.322	3.8e-06	9.9e+02	1.2e+11	1.018512e+11	-7.320263e+09	0:0:00	lu	25✓
4	16	0.125	0.422	8.6e-06	5.7e+02	1.1e+11	9.526473e+10	-6.968352e+09	0:0:00	lu	30✓
	17	0.128	0.273	7.5e-06	4.2e+02	1.0e+11	8.903090e+10	-7.345571e+09	0:0:00	lu	30✓

```
6
18|0.089|0.144|1.3e-05|3.6e+02|1.0e+11| 8.630588e+10 -7.527050e+09| 0:0:00| 1u 19✓
30
19|0.084|0.164|1.4e-04|3.0e+02|1.0e+11| 8.418235e+10 -7.064518e+09| 0:0:00| 1u 16✓
27
20|0.047|0.108|2.1e-04|2.7e+02|9.9e+10| 8.256900e+10 -7.727820e+09| 0:0:00| 1u 25✓
9
21|0.100|0.198|2.3e-04|2.1e+02|9.6e+10| 7.989368e+10 -7.656646e+09| 0:0:00| 1u 30✓
30
22|0.080|0.094|2.2e-04|1.9e+02|9.4e+10| 7.739762e+10 -8.199903e+09| 0:0:00| 1u 30✓
^21
23|0.001|0.006|9.7e-04|1.9e+02|9.4e+10| 7.734522e+10 -7.778392e+09| 0:0:00| 1u 13✓
^16
24|0.002|0.001|4.8e-04|1.9e+02|9.4e+10| 7.723636e+10 -7.718650e+09| 0:0:00| 1u 19✓
30
25|0.000|0.000|4.7e-04|1.9e+02|9.4e+10| 7.717740e+10 -7.706711e+09| 0:0:00| 1u 30✓
30
26|0.000|0.000|4.7e-04|1.9e+02|9.4e+10| 7.719338e+10 -8.127199e+09| 0:0:00| 1u 22✓
^22
27|0.053|0.077|7.1e-04|1.8e+02|9.4e+10| 7.628082e+10 -8.663334e+09| 0:0:00| 1u 20✓
^22
28|0.001|0.005|1.0e-03|1.8e+02|9.3e+10| 7.598965e+10 -8.063750e+09| 0:0:00| 1u 30✓
13
29|0.100|0.179|8.1e-04|1.5e+02|9.1e+10| 7.390525e+10 -8.211482e+09| 0:0:00| 1u 30✓
8
30|0.068|0.332|8.3e-04|9.7e+01|8.7e+10| 7.179821e+10 -7.663502e+09| 0:0:00| 1u 30✓
9
31|0.113|0.143|6.6e-04|8.3e+01|8.4e+10| 6.860036e+10 -7.789694e+09| 0:0:01| 1u 12 ^✓
3
32|0.003|0.004|7.4e-04|8.3e+01|8.4e+10| 6.852261e+10 -7.832174e+09| 0:0:01| 1u 12✓
^12
33|0.007|0.062|9.7e-04|7.8e+01|8.3e+10| 6.854449e+10 -7.024252e+09| 0:0:01| 1u 30✓
18
34|0.021|0.186|1.1e-03|6.3e+01|8.1e+10| 6.772438e+10 -6.561192e+09| 0:0:01| 1u 30✓
8
35|0.115|0.177|1.1e-03|5.2e+01|7.9e+10| 6.472989e+10 -6.816641e+09| 0:0:01| 1u 17✓
15
36|0.104|0.084|8.4e-04|4.8e+01|7.7e+10| 6.208451e+10 -7.333936e+09| 0:0:01| 1u 30 ^✓
4
37|0.011|0.081|4.4e-04|4.4e+01|7.6e+10| 6.203418e+10 -7.377041e+09| 0:0:01| 1u 30✓
8
38|0.065|0.255|5.9e-04|3.3e+01|7.4e+10| 6.021276e+10 -6.926290e+09| 0:0:01| 1u 30✓
6
39|0.124|0.164|5.7e-04|2.7e+01|7.1e+10| 5.700563e+10 -7.233302e+09| 0:0:01| 1u 30 ^✓
9
40|0.125|0.212|3.4e-04|2.1e+01|6.9e+10| 5.475166e+10 -7.122388e+09| 0:0:01| 1u 21✓
^11
41|0.071|0.216|4.0e-04|1.7e+01|6.6e+10| 5.268045e+10 -7.115772e+09| 0:0:01| 1u 17 ^✓
4
42|0.109|0.204|9.4e-04|1.3e+01|6.4e+10| 5.067970e+10 -6.815284e+09| 0:0:01| 1u 17✓
30
43|0.004|0.005|1.0e-03|1.3e+01|6.4e+10| 5.060231e+10 -6.799060e+09| 0:0:01| 1u 12✓
25
44|0.003|0.005|1.3e-03|1.3e+01|6.4e+10| 5.045794e+10 -6.751845e+09| 0:0:01| 1u 30✓
```



```

^18
45|0.000|0.002|9.6e-04|1.3e+01|6.5e+10| 5.047331e+10 -7.129651e+09| 0:0:01| 1u 30✓
^15
46|0.089|0.078|2.9e-03|1.2e+01|6.4e+10| 4.896093e+10 -7.870165e+09| 0:0:01| 1u 17 ^✓
8
47|0.001|0.003|1.3e-03|1.2e+01|6.4e+10| 4.900280e+10 -7.553688e+09| 0:0:01| 1u 17✓
30
48|0.031|0.142|1.4e-03|1.0e+01|6.3e+10| 4.845485e+10 -8.448841e+09| 0:0:01| 1u 23✓
9
49|0.159|0.355|1.2e-03|6.8e+00|5.8e+10| 4.555551e+10 -5.158160e+09| 0:0:01| 1u 30✓
4
50|0.226|0.260|2.2e-03|5.0e+00|5.4e+10| 4.082792e+10 -6.536959e+09| 0:0:01|
  sqlp stop: maximum number of iterations reached

```

```

-----
number of iterations    = 50
primal objective value =  4.08279242e+10
dual   objective value = -6.53695890e+09
gap := trace(XZ)        = 5.42e+10
relative gap           = 1.14e+00
actual relative gap     = 1.00e+00
rel. primal infeas      = 2.16e-03
rel. dual   infeas      = 5.00e+00
norm(X), norm(y), norm(Z) = 3.6e+11, 6.5e+09, 9.2e+09
norm(A), norm(b), norm(C) = 6.1e+09, 3.4e+08, 7.7e+01
Total CPU time (secs)   = 0.87
CPU time per iteration = 0.02
termination code        = -6
DIMACS errors: 2.8e-03  0.0e+00  7.1e+00  0.0e+00  1.0e+00  1.1e+00
-----

```

ans =

1.2445e+12

Iteration 7 Total error is: 1.6039

```

num. of constraints = 45
dim. of socp var   = 46,   num. of socp blk = 1
dim. of linear var = 800
*****
SDPT3: Infeasible path-following algorithms
*****
version predcorr gam expon scale_data
HKM      1      0.000  1      0
it pstep dstep pinfeas dinfeas gap      prim-obj      dual-obj      cputime
-----
0|0.000|0.000|1.0e+00|2.5e+05|8.0e+10| 1.037397e+09  0.000000e+00| 0:0:00| chol  2✓
2
1|1.000|0.973|4.7e-07|6.8e+03|4.0e+09| 9.814264e+08 -6.551341e+06| 0:0:00| chol  4✓
4
2|0.708|0.524|1.4e-07|3.2e+03|2.4e+09| 8.657290e+08 -8.152003e+06| 0:0:00| chol  4✓
5
3|0.329|0.557|9.5e-08|1.4e+03|1.7e+09| 8.518181e+08 -1.180979e+07| 0:0:00| chol  5✓
6

```

```

4|0.341|0.409|8.4e-08|8.5e+02|1.4e+09| 8.155737e+08 -1.451147e+07| 0:0:00| chol 5✓
6
5|0.260|0.615|8.3e-08|3.3e+02|1.0e+09| 7.688597e+08 -1.356857e+07| 0:0:00| chol 4✓
5
6|0.309|0.197|9.4e-08|2.6e+02|9.0e+08| 6.910315e+08 -1.511806e+07| 0:0:00| chol 8✓
20
7|0.100|0.508|3.2e-06|1.3e+02|7.8e+08| 6.707089e+08 -9.462209e+06| 0:0:00| chol 6✓
8
8|0.113|0.226|1.5e-06|1.0e+02|7.5e+08| 6.532558e+08 -1.246404e+07| 0:0:00| chol 7✓
9
9|0.207|0.258|1.3e-06|7.4e+01|7.1e+08| 6.185178e+08 -1.519600e+07| 0:0:00| chol 6✓
7
10|0.167|0.201|2.6e-06|5.9e+01|6.8e+08| 5.928038e+08 -1.763059e+07| 0:0:00| chol 13✓
10
11|0.249|0.083|6.4e-05|5.4e+01|6.6e+08| 5.745188e+08 -1.823431e+07| 0:0:00| chol 6✓
7
12|0.013|0.181|6.3e-05|4.5e+01|6.5e+08| 5.626394e+08 -2.003230e+07| 0:0:00| chol 5✓
6
13|0.860|0.804|9.0e-06|8.7e+00|1.3e+08| 1.060852e+08 -7.792671e+06| 0:0:00| chol 5✓
5
14|0.189|0.220|7.3e-06|6.8e+00|1.2e+08| 9.922217e+07 -9.063490e+06| 0:0:00| chol 7✓
7
15|0.165|0.177|5.9e-06|5.6e+00|1.2e+08| 9.460586e+07 -9.308001e+06| 0:0:00| chol 9✓
23
16|0.146|0.178|1.1e-04|4.6e+00|1.1e+08| 9.183624e+07 -7.011905e+06| 0:0:00| chol 6✓
*10
17|0.025|0.174|1.1e-04|3.8e+00|1.1e+08| 9.024861e+07 -9.450119e+06| 0:0:00| chol 6✓
*10
18|0.184|0.357|8.8e-05|2.5e+00|1.0e+08| 8.402128e+07 -8.761898e+06| 0:0:00| chol *
warning: symqmr failed: 2.0
switch to LU factor. lu 20 3
19|0.142|0.182|7.6e-05|2.0e+00|9.9e+07| 7.989392e+07 -9.108664e+06| 0:0:00| lu 28✓
6
20|0.128|0.209|6.3e-05|1.6e+00|9.6e+07| 7.707590e+07 -8.995497e+06| 0:0:00| lu 30✓
10
21|0.089|0.161|6.0e-05|1.3e+00|9.4e+07| 7.436603e+07 -9.300512e+06| 0:0:00| lu 16✓
^20
22|0.079|0.250|1.3e-04|1.0e+00|9.0e+07| 7.267697e+07 -7.857294e+06| 0:0:00| lu 30✓
4
23|0.059|0.147|1.0e-04|8.5e-01|8.8e+07| 7.067689e+07 -8.422110e+06| 0:0:00| lu 29✓
4
24|0.196|0.282|8.1e-05|6.1e-01|8.4e+07| 6.642309e+07 -8.284606e+06| 0:0:00| lu *22✓
3
25|0.104|0.214|7.0e-05|4.8e-01|8.1e+07| 6.314200e+07 -8.921685e+06| 0:0:00| lu 30✓
5
26|0.129|0.172|6.4e-05|4.0e-01|7.8e+07| 6.032332e+07 -9.051824e+06| 0:0:00| lu 15✓
^23
27|0.103|0.191|4.8e-05|3.2e-01|7.6e+07| 5.835545e+07 -9.081242e+06| 0:0:00| lu 29✓
7
28|0.093|0.148|5.1e-05|2.7e-01|7.4e+07| 5.643233e+07 -9.158762e+06| 0:0:00| lu 17✓
10
29|0.086|0.324|4.7e-05|1.9e-01|7.0e+07| 5.507992e+07 -7.935380e+06| 0:0:00| lu 30✓
7
30|0.121|0.170|4.3e-05|1.5e-01|6.7e+07| 5.211308e+07 -7.889259e+06| 0:0:00| lu 30✓

```

```

^27
31|0.003|0.007|2.1e-04|1.5e-01|6.7e+07| 5.204912e+07 -7.893392e+06| 0:0:00| 1u 12✓
30
32|0.023|0.051|1.8e-04|1.5e-01|6.6e+07| 5.155263e+07 -7.736024e+06| 0:0:00| 1u 27✓
7
33|0.090|0.108|2.2e-04|1.3e-01|6.5e+07| 5.069288e+07 -7.635848e+06| 0:0:00| 1u *19✓
4
34|0.129|0.188|2.4e-04|1.1e-01|6.0e+07| 4.563075e+07 -6.966831e+06| 0:0:00| 1u *22✓
3
35|0.226|0.668|2.4e-04|3.5e-02|4.8e+07| 4.072886e+07 -4.464852e+06| 0:0:00| 1u *12✓
3
36|0.639|0.235|7.3e-05|2.7e-02|3.7e+07| 2.784312e+07 -5.351963e+06| 0:0:00| 1u 23✓
6
37|1.000|0.270|2.0e-04|1.9e-02|2.8e+07| 1.836742e+07 -6.029728e+06| 0:0:00| 1u *12✓
4
38|1.000|1.000|5.3e-04|2.2e-05|1.4e+07| 1.045041e+07 -2.868987e+06| 0:0:00| 1u 7✓
3
39|1.000|1.000|7.3e-05|3.3e-05|1.0e+07| 7.716089e+06 -2.183374e+06| 0:0:00| 1u 5✓
2
40|1.000|1.000|8.2e-06|1.5e-05|3.0e+06| 2.110174e+06 -8.183782e+05| 0:0:00| 1u 6✓
2
41|1.000|1.000|7.8e-07|1.6e-06|1.4e+06| 1.048840e+06 -2.996273e+05| 0:0:00| 1u 4✓
2
42|1.000|1.000|2.4e-07|1.6e-07|4.5e+05| 3.240382e+05 -1.252274e+05| 0:0:00| 1u 4✓
2
43|1.000|1.000|8.9e-08|4.8e-08|1.8e+05| 1.409006e+05 -4.113222e+04| 0:0:00| 1u 4✓
2
44|1.000|1.000|7.6e-08|1.8e-08|5.6e+04| 4.054722e+04 -1.582674e+04| 0:0:01| 1u 4✓
2
45|1.000|1.000|3.3e-08|1.5e-08|2.4e+04| 1.816380e+04 -5.327659e+03| 0:0:01| 1u 4✓
2
46|1.000|1.000|2.8e-08|6.6e-09|7.2e+03| 5.124014e+03 -2.028803e+03| 0:0:01| 1u 3✓
2
47|1.000|1.000|9.9e-09|5.7e-09|3.0e+03| 2.299181e+03 -7.100839e+02| 0:0:01| 1u 3✓
1
48|1.000|1.000|6.5e-09|2.0e-09|9.1e+02| 6.160673e+02 -2.897060e+02| 0:0:01| 1u 3✓
1
49|1.000|1.000|2.7e-09|1.3e-09|3.8e+02| 2.572700e+02 -1.262541e+02| 0:0:01| 1u 3✓
1
50|1.000|1.000|1.0e-09|5.4e-10|1.1e+02| 3.877688e+01 -7.364927e+01| 0:0:01|
  sqlp stop: maximum number of iterations reached
-----
number of iterations    = 50
primal objective value =  7.26769696e+07
dual   objective value = -7.85729440e+06
gap := trace(XZ)       = 8.95e+07
relative gap           = 1.11e+00
actual relative gap    = 1.00e+00
rel. primal infeas     = 1.26e-04
rel. dual   infeas     = 9.99e-01
norm(X), norm(y), norm(Z) = 2.0e+08, 7.9e+06, 1.1e+07
norm(A), norm(b), norm(C) = 3.7e+07, 1.5e+06, 7.7e+01
Total CPU time (secs)   = 0.56
CPU time per iteration = 0.01

```

```
termination code      = -6  
DIMACS errors: 1.4e-04  0.0e+00  1.4e+00  0.0e+00  1.0e+00  1.1e+00  
-----
```

```
ans =
```

```
308744576
```

```
Iteration    8    Total error is: 0.032339
```

```
The total representation error of the testing signals is: 0.0094079
```

```
>>
```