```
>> demo_Polynomial_Dictionary_Learning
Starting to train the dictionary
solving the quadratic problem with YALMIP...

 num. of constraints = 85
 dim. of socp   var  = 86,   num. of socp blk  =  1
 dim. of linear var  = 1000
*******************************************************************
   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+02|2.3e+07| 2.394023e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.989|9.4e-08|1.7e+00|2.9e+05| 2.544542e+04 -9.857129e+01| 0:0:00| chol  1↙
1
 2|1.000|0.976|1.3e-07|7.6e-02|2.8e+04| 1.875306e+04 -2.440118e+01| 0:0:00| chol  1↙
1
 3|0.980|1.000|1.2e-07|1.1e-02|2.1e+03| 1.700739e+03 -2.601046e+01| 0:0:01| chol  1↙
1
 4|1.000|1.000|1.6e-08|3.3e-03|2.2e+02| 1.759423e+02 -2.619870e+01| 0:0:01| chol  1↙
1
 5|0.713|0.718|8.6e-09|1.2e-03|7.2e+01| 4.362103e+01 -2.548398e+01| 0:0:01| chol  1↙
1
 6|0.863|0.877|2.6e-09|1.7e-04|5.6e+01| 3.047645e+01 -2.480902e+01| 0:0:01| chol  1↙
1
 7|1.000|1.000|1.3e-10|3.3e-06|3.5e+01| 1.038831e+01 -2.462861e+01| 0:0:01| chol  1↙
1
 8|1.000|1.000|2.7e-11|3.3e-07|2.0e+01|-3.854513e+00 -2.432881e+01| 0:0:01| chol  1↙
1
 9|1.000|1.000|6.8e-12|3.3e-08|8.0e+00|-1.597478e+01 -2.402256e+01| 0:0:01| chol  1↙
1
10|1.000|1.000|6.0e-13|3.3e-09|3.6e+00|-2.018384e+01 -2.380403e+01| 0:0:01| chol  1↙
1
11|1.000|1.000|5.8e-14|3.3e-10|1.0e+00|-2.260244e+01 -2.362145e+01| 0:0:01| chol  1↙
1
12|1.000|1.000|6.1e-13|3.4e-11|2.5e-01|-2.329376e+01 -2.354241e+01| 0:0:01| chol  1↙
1
13|0.685|1.000|2.2e-12|4.3e-12|1.1e-01|-2.341231e+01 -2.352603e+01| 0:0:01| chol  1↙
1
14|0.960|1.000|1.5e-11|1.3e-12|2.6e-02|-2.349581e+01 -2.352167e+01| 0:0:01| chol  1↙
2
15|0.986|0.982|1.8e-12|1.6e-12|7.3e-03|-2.351267e+01 -2.352001e+01| 0:0:01| chol  2↙
2
16|0.924|1.000|3.0e-12|1.0e-12|1.4e-03|-2.351790e+01 -2.351933e+01| 0:0:01| chol  2↙
2
17|1.000|0.993|5.0e-12|1.0e-12|6.1e-05|-2.351917e+01 -2.351923e+01| 0:0:01| chol  3↙
3
18|0.992|0.986|1.0e-11|1.0e-12|2.8e-06|-2.351922e+01 -2.351923e+01| 0:0:01|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-------------------------------------------------------------------
 number of iterations   = 18
```

```
 primal objective value = -2.35192234e+01
 dual   objective value = -2.35192262e+01
 gap := trace(XZ)       = 2.78e-06
 relative gap           = 5.79e-08
 actual relative gap    = 5.79e-08
 rel. primal infeas     = 1.04e-11
 rel. dual   infeas     = 1.01e-12
 norm(X), norm(y), norm(Z) = 8.8e+00, 6.3e+01, 2.3e+01
 norm(A), norm(b), norm(C) = 1.4e+03, 8.8e+02, 7.8e+01
 Total CPU time (secs)  = 0.74
 CPU time per iteration = 0.04
 termination code       =  0
 DIMACS errors: 3.0e-11  0.0e+00  1.5e-12  0.0e+00  5.8e-08  5.8e-08
------------------------------------------------------------------

ans =

   23.5192


 num. of constraints = 85
 dim. of socp   var  = 86,   num. of socp blk  =  1
 dim. of linear var  = 1000
*******************************************************************
   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+02|5.9e+07| 6.473286e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.990|2.6e-07|1.7e+00|7.5e+05| 6.627477e+04 -2.462305e+02| 0:0:00| chol  1↙
1
 2|1.000|0.927|1.7e-07|2.2e-01|1.1e+05| 4.606122e+04 -1.705237e+01| 0:0:00| chol  1↙
1
 3|0.821|1.000|6.3e-08|3.0e-02|3.3e+04| 2.571189e+04 -4.361126e+01| 0:0:00| chol  1↙
1
 4|1.000|1.000|6.5e-09|9.1e-03|5.5e+03| 4.685409e+03 -2.934848e+01| 0:0:00| chol  1↙
1
 5|0.924|0.915|5.6e-09|3.3e-03|4.8e+02| 4.105614e+02 -2.249661e+01| 0:0:00| chol  1↙
1
 6|0.162|1.000|5.1e-09|2.7e-04|4.2e+02| 4.000605e+02 -1.704386e+01| 0:0:00| chol  1↙
1
 7|1.000|0.996|8.8e-10|2.8e-05|3.1e+02| 3.028355e+02 -1.012554e+01| 0:0:00| chol  1↙
1
 8|1.000|1.000|1.6e-10|2.7e-06|1.5e+02| 1.372855e+02 -8.830829e+00| 0:0:00| chol  1↙
1
 9|1.000|1.000|1.9e-11|2.7e-07|6.5e+01| 5.804337e+01 -6.862818e+00| 0:0:00| chol  1↙
1
10|1.000|1.000|5.4e-13|2.7e-08|2.3e+01| 1.729595e+01 -6.054634e+00| 0:0:00| chol  1↙
1
11|1.000|1.000|4.7e-14|2.7e-09|9.4e+00| 3.800701e+00 -5.637490e+00| 0:0:00| chol  1↙
1
```

```
12|0.991|1.000|1.5e-12|2.7e-10|2.1e+00|-3.361898e+00 -5.479567e+00| 0:0:00| chol  2↙
2
13|1.000|1.000|1.3e-12|2.8e-11|9.7e-01|-4.446311e+00 -5.418838e+00| 0:0:00| chol  2↙
1
14|0.933|1.000|1.8e-11|3.7e-12|2.3e-01|-5.163398e+00 -5.388744e+00| 0:0:00| chol  2↙
2
15|1.000|1.000|6.6e-12|1.8e-12|1.1e-01|-5.277009e+00 -5.382312e+00| 0:0:00| chol  2↙
2
16|0.984|0.863|2.5e-12|1.6e-12|1.5e-02|-5.362431e+00 -5.377591e+00| 0:0:00| chol  2↙
2
17|0.790|0.887|5.4e-12|1.2e-12|6.3e-03|-5.370549e+00 -5.376805e+00| 0:0:00| chol  2↙
2
18|0.840|0.946|4.1e-11|1.1e-12|1.6e-03|-5.374969e+00 -5.376605e+00| 0:0:00| chol  3↙
4
19|0.875|0.912|3.2e-10|1.7e-12|3.8e-04|-5.376202e+00 -5.376579e+00| 0:0:00| chol  5↙
6
20|1.000|1.000|1.6e-09|2.4e-12|1.1e-04|-5.376464e+00 -5.376573e+00| 0:0:00| chol  6↙
7
21|0.677|0.882|1.2e-09|3.9e-12|6.2e-05|-5.376510e+00 -5.376572e+00| 0:0:00| chol
  warning: symqmr failed: 0.3
  switch to LU factor. lu 30   1
22|0.877|1.000|8.3e-10|5.5e-12|3.5e-05|-5.376536e+00 -5.376571e+00| 0:0:00| lu 30↙
1
23|1.000|1.000|6.4e-10|8.2e-12|1.1e-05|-5.376560e+00 -5.376571e+00| 0:0:00| lu 30↙
30
24|0.724|0.986|1.6e-09|1.2e-11|3.7e-06|-5.376567e+00 -5.376571e+00| 0:0:00| lu 30↙
^12
25|0.967|1.000|5.6e-09|1.8e-11|1.3e-06|-5.376569e+00 -5.376571e+00| 0:0:00| lu 30 ^↙
7
26|0.550|0.410|3.5e-09|3.8e-11|9.8e-07|-5.376570e+00 -5.376571e+00| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-------------------------------------------------------------------
 number of iterations   = 26
 primal objective value = -5.37656995e+00
 dual   objective value = -5.37657087e+00
 gap := trace(XZ)       = 9.77e-07
 relative gap           = 8.31e-08
 actual relative gap    = 7.82e-08
 rel. primal infeas     = 3.47e-09
 rel. dual   infeas     = 3.85e-11
 norm(X), norm(y), norm(Z) = 3.3e+01, 9.8e+01, 6.8e+01
 norm(A), norm(b), norm(C) = 2.1e+03, 2.8e+03, 7.8e+01
 Total CPU time (secs)  = 0.39
 CPU time per iteration = 0.02
 termination code       =  0
 DIMACS errors: 8.2e-09  0.0e+00  5.6e-11  0.0e+00  7.8e-08  8.3e-08
-------------------------------------------------------------------

ans =

    5.3766

Iteration   2   Total error is: 0.0094565
```

```
 num. of constraints = 85
 dim. of socp   var  = 86,   num. of socp blk  =  1
 dim. of linear var  = 1000
*******************************************************************
   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+02|5.8e+07| 6.399684e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.990|1.6e-07|1.7e+00|7.5e+05| 6.553289e+04 -2.838398e+02| 0:0:00| chol  1↙
1
 2|1.000|0.932|1.3e-07|2.1e-01|1.1e+05| 4.540339e+04 -1.603405e+01| 0:0:00| chol  1↙
1
 3|0.859|1.000|4.0e-08|3.0e-02|3.0e+04| 2.327043e+04 -4.018457e+01| 0:0:00| chol  1↙
1
 4|1.000|1.000|2.3e-09|9.1e-03|4.5e+03| 3.830820e+03 -2.702457e+01| 0:0:00| chol  1↙
1
 5|0.898|0.886|3.0e-09|3.5e-03|5.1e+02| 4.398389e+02 -2.058166e+01| 0:0:00| chol  1↙
1
 6|0.160|1.000|2.7e-09|2.7e-04|4.5e+02| 4.282353e+02 -1.541525e+01| 0:0:00| chol  1↙
1
 7|1.000|1.000|6.1e-10|2.7e-05|3.4e+02| 3.257436e+02 -9.586013e+00| 0:0:00| chol  1↙
1
 8|1.000|1.000|7.6e-11|2.7e-06|1.5e+02| 1.398161e+02 -7.411651e+00| 0:0:00| chol  1↙
1
 9|1.000|1.000|1.3e-11|2.7e-07|6.6e+01| 5.980447e+01 -5.845991e+00| 0:0:00| chol  1↙
1
10|1.000|1.000|9.7e-13|2.7e-08|2.6e+01| 2.093088e+01 -4.871601e+00| 0:0:00| chol  1↙
1
11|1.000|1.000|6.5e-13|2.7e-09|8.2e+00| 3.734381e+00 -4.502883e+00| 0:0:00| chol  1↙
1
12|1.000|1.000|1.3e-11|2.7e-10|2.2e+00|-2.190313e+00 -4.350762e+00| 0:0:00| chol  2↙
1
13|1.000|1.000|2.8e-12|2.9e-11|5.0e-01|-3.794126e+00 -4.296639e+00| 0:0:00| chol  2↙
2
14|1.000|1.000|4.1e-12|3.7e-12|2.2e-01|-4.056497e+00 -4.277618e+00| 0:0:00| chol  2↙
2
15|0.957|1.000|5.8e-12|1.3e-12|5.8e-02|-4.214040e+00 -4.271713e+00| 0:0:00| chol  2↙
2
16|1.000|1.000|6.6e-12|1.2e-12|2.2e-02|-4.248295e+00 -4.270591e+00| 0:0:00| chol  2↙
2
17|0.934|0.768|2.8e-11|1.6e-12|3.0e-03|-4.266907e+00 -4.269921e+00| 0:0:00| chol  3↙
3
18|0.751|0.860|2.3e-11|2.2e-12|1.2e-03|-4.268649e+00 -4.269827e+00| 0:0:00| chol  3↙
3
19|0.737|0.968|4.4e-11|3.0e-12|4.4e-04|-4.269361e+00 -4.269804e+00| 0:0:00| chol  4↙
4
20|0.863|0.973|1.0e-10|4.5e-12|8.5e-05|-4.269716e+00 -4.269800e+00| 0:0:00| chol  8↙
8
21|1.000|1.000|1.9e-10|6.7e-12|5.0e-06|-4.269795e+00 -4.269800e+00| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
```

```
  switch to LU factor. lu 30  30
22|0.714|0.630|2.7e-08|1.2e-11|1.8e-06|-4.269798e+00 -4.269800e+00| 0:0:00| lu 11↙
30
23|0.113|0.164|3.3e-08|2.5e-11|1.7e-06|-4.269796e+00 -4.269800e+00| 0:0:00| lu 30↙
30
24|0.224|0.201|3.1e-08|4.3e-11|1.6e-06|-4.269797e+00 -4.269800e+00| 0:0:00|
  stop: progress is too slow
  stop: progress is bad
-----------------------------------------------------------------
 number of iterations   = 24
 primal objective value = -4.26979788e+00
 dual   objective value = -4.26979951e+00
 gap := trace(XZ)       = 1.79e-06
 relative gap           = 1.87e-07
 actual relative gap    = 1.71e-07
 rel. primal infeas     = 2.66e-08
 rel. dual   infeas     = 1.25e-11
 norm(X), norm(y), norm(Z) = 3.5e+01, 1.0e+02, 7.2e+01
 norm(A), norm(b), norm(C) = 2.1e+03, 3.2e+03, 7.8e+01
 Total CPU time (secs)  = 0.40
 CPU time per iteration = 0.02
 termination code       = -5
 DIMACS errors: 5.2e-08  0.0e+00  1.8e-11  0.0e+00  1.7e-07  1.9e-07
-----------------------------------------------------------------

ans =

    4.2698

Iteration   3   Total error is: 0.008425

 num. of constraints = 85
 dim. of socp   var  = 86,   num. of socp blk  =  1
 dim. of linear var  = 1000
*****************************************************************
   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|1.5e+02|9.1e+07| 1.017339e+05  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.990|7.6e-08|1.7e+00|1.2e+06| 1.029998e+05 -3.755791e+02| 0:0:00| chol  1↙
1
 2|1.000|0.927|5.6e-08|2.2e-01|1.8e+05| 7.168803e+04 -2.569421e+01| 0:0:00| chol  1↙
1
 3|0.779|1.000|2.1e-08|5.1e-02|5.7e+04| 3.963261e+04 -6.039023e+01| 0:0:00| chol  1↙
1
 4|1.000|1.000|2.2e-09|1.5e-02|8.0e+03| 6.373734e+03 -3.771711e+01| 0:0:00| chol  1↙
1
 5|0.904|0.887|2.1e-09|5.8e-03|9.0e+02| 7.406313e+02 -2.772892e+01| 0:0:00| chol  1↙
1
 6|0.185|1.000|1.6e-09|1.4e-03|7.7e+02| 7.195595e+02 -2.236392e+01| 0:0:00| chol  1↙
```

```
1
 7|1.000|0.875|1.4e-09|5.3e-04|5.5e+02| 5.310111e+02 -1.186097e+01| 0:0:00| chol  1↙
1
 8|1.000|1.000|9.3e-11|4.1e-05|2.8e+02| 2.718313e+02 -9.258768e+00| 0:0:00| chol  1↙
1
 9|1.000|1.000|3.2e-11|4.1e-06|1.2e+02| 1.174950e+02 -6.000761e+00| 0:0:00| chol  1↙
1
10|1.000|1.000|3.6e-13|4.1e-07|5.3e+01| 4.819496e+01 -4.458896e+00| 0:0:00| chol  1↙
1
11|1.000|1.000|6.7e-13|4.1e-08|1.9e+01| 1.495842e+01 -3.690669e+00| 0:0:00| chol  1↙
1
12|1.000|1.000|3.1e-13|4.1e-09|5.3e+00| 1.943831e+00 -3.380088e+00| 0:0:00| chol  1↙
2
13|1.000|1.000|2.8e-13|4.1e-10|1.2e+00|-2.065618e+00 -3.312166e+00| 0:0:00| chol  2↙
2
14|1.000|1.000|6.5e-13|4.2e-11|2.8e-01|-3.013847e+00 -3.296366e+00| 0:0:00| chol  2↙
2
15|0.930|1.000|3.1e-12|5.1e-12|9.0e-02|-3.199003e+00 -3.289271e+00| 0:0:00| chol  2↙
2
16|1.000|1.000|3.4e-11|1.4e-12|4.6e-02|-3.241779e+00 -3.287579e+00| 0:0:00| chol  2↙
2
17|1.000|1.000|5.1e-11|1.5e-12|1.8e-02|-3.269007e+00 -3.286597e+00| 0:0:00| chol  3↙
2
18|1.000|1.000|5.0e-11|2.3e-12|7.5e-03|-3.278546e+00 -3.286089e+00| 0:0:00| chol  3↙
3
19|1.000|1.000|4.7e-11|3.4e-12|1.7e-03|-3.284066e+00 -3.285806e+00| 0:0:00| chol  3↙
3
20|0.917|1.000|6.4e-11|5.1e-12|5.0e-04|-3.285262e+00 -3.285763e+00| 0:0:00| chol  5↙
5
21|0.561|0.749|1.7e-10|8.9e-12|3.0e-04|-3.285462e+00 -3.285759e+00| 0:0:00| chol  7↙
8
22|0.869|1.000|7.9e-10|1.1e-11|1.2e-04|-3.285635e+00 -3.285755e+00| 0:0:00| chol 10↙
14
23|0.996|0.916|9.5e-10|1.8e-11|2.6e-05|-3.285728e+00 -3.285754e+00| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 19 ^ 7
24|0.958|0.900|3.8e-09|2.7e-11|3.7e-06|-3.285750e+00 -3.285754e+00| 0:0:00| lu 30↙
^13
25|0.208|0.235|1.4e-09|5.9e-11|3.1e-06|-3.285751e+00 -3.285754e+00| 0:0:00| lu 30↙
30
26|0.373|0.281|5.1e-09|1.0e-10|2.9e-06|-3.285751e+00 -3.285754e+00| 0:0:00|
  stop: progress is too slow
-----------------------------------------------------------------
 number of iterations   = 26
 primal objective value = -3.28575101e+00
 dual   objective value = -3.28575355e+00
 gap := trace(XZ)       = 2.91e-06
 relative gap           = 3.84e-07
 actual relative gap    = 3.36e-07
 rel. primal infeas     = 5.09e-09
 rel. dual   infeas     = 1.00e-10
 norm(X), norm(y), norm(Z) = 3.5e+01, 1.0e+02, 7.2e+01
 norm(A), norm(b), norm(C) = 2.3e+03, 4.8e+03, 7.8e+01
 Total CPU time (secs)  = 0.36
```

```
 CPU time per iteration = 0.01
 termination code       = -5
 DIMACS errors: 9.4e-09  0.0e+00  1.5e-10  0.0e+00  3.4e-07  3.8e-07
------------------------------------------------------------------

ans =

    3.2858

Iteration   4   Total error is: 0.0073859

 num. of constraints = 85
 dim. of socp   var  = 86,   num. of socp blk  =  1
 dim. of linear var  = 1000
*******************************************************************
   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|1.5e+02|9.3e+07| 1.039062e+05  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.990|8.0e-08|1.7e+00|1.2e+06| 1.051747e+05 -3.686949e+02| 0:0:00| chol  1↙
1
 2|1.000|0.926|5.7e-08|2.2e-01|1.8e+05| 7.319230e+04 -2.642206e+01| 0:0:00| chol  1↙
1
 3|0.770|1.000|2.2e-08|5.1e-02|5.9e+04| 4.105714e+04 -6.223459e+01| 0:0:00| chol  1↙
1
 4|1.000|1.000|2.2e-09|1.5e-02|8.4e+03| 6.655115e+03 -3.880874e+01| 0:0:00| chol  1↙
1
 5|0.906|0.889|2.3e-09|5.8e-03|9.3e+02| 7.606594e+02 -2.844498e+01| 0:0:00| chol  1↙
1
 6|0.188|1.000|1.8e-09|1.4e-03|7.9e+02| 7.385809e+02 -2.273873e+01| 0:0:00| chol  1↙
1
 7|1.000|0.873|1.4e-09|5.3e-04|5.6e+02| 5.439985e+02 -1.191935e+01| 0:0:00| chol  1↙
1
 8|1.000|1.000|9.9e-11|4.1e-05|2.9e+02| 2.793253e+02 -9.181271e+00| 0:0:00| chol  1↙
1
 9|1.000|1.000|2.2e-11|4.1e-06|1.3e+02| 1.205745e+02 -5.761620e+00| 0:0:00| chol  1↙
1
10|1.000|1.000|7.0e-13|4.1e-07|5.4e+01| 5.023942e+01 -4.121139e+00| 0:0:00| chol  1↙
1
11|1.000|1.000|2.4e-13|4.1e-08|2.0e+01| 1.625118e+01 -3.292563e+00| 0:0:00| chol  1↙
1
12|1.000|1.000|3.4e-13|4.1e-09|5.9e+00| 2.993474e+00 -2.945164e+00| 0:0:00| chol  1↙
1
13|1.000|1.000|5.6e-12|4.1e-10|1.5e+00|-1.380253e+00 -2.862594e+00| 0:0:00| chol  2↙
2
14|1.000|1.000|2.9e-13|4.2e-11|3.3e-01|-2.518129e+00 -2.843245e+00| 0:0:00| chol  2↙
2
15|0.923|1.000|2.8e-12|5.1e-12|9.8e-02|-2.740117e+00 -2.837666e+00| 0:0:00| chol  2↙
2
16|1.000|1.000|7.2e-11|1.4e-12|4.8e-02|-2.787223e+00 -2.835432e+00| 0:0:00| chol  2↙
```

```
3
17|0.964|0.860|1.6e-10|1.7e-12|9.2e-03|-2.825265e+00 -2.834455e+00| 0:0:00| chol  3↙
3
18|0.919|0.890|9.1e-11|2.4e-12|4.4e-03|-2.829856e+00 -2.834288e+00| 0:0:00| chol  3↙
4
19|1.000|1.000|3.8e-10|3.4e-12|2.0e-03|-2.832190e+00 -2.834205e+00| 0:0:00| chol  3↙
4
20|0.952|1.000|4.7e-11|5.1e-12|9.0e-04|-2.833269e+00 -2.834166e+00| 0:0:00| chol  4↙
4
21|1.000|1.000|8.9e-11|7.6e-12|2.8e-04|-2.833870e+00 -2.834155e+00| 0:0:00| chol  4↙
5
22|1.000|1.000|1.1e-10|1.1e-11|1.3e-04|-2.834020e+00 -2.834151e+00| 0:0:00| chol  4↙
5
23|1.000|1.000|4.2e-11|1.7e-11|2.3e-05|-2.834126e+00 -2.834149e+00| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30   1
24|1.000|1.000|2.6e-10|8.3e-12|4.6e-06|-2.834145e+00 -2.834149e+00| 0:0:00| lu 30↙
30
25|1.000|1.000|3.8e-09|1.2e-11|7.8e-07|-2.834148e+00 -2.834149e+00| 0:0:00| lu 30↙
30
26|0.646|0.562|1.5e-08|2.4e-11|3.4e-07|-2.834149e+00 -2.834149e+00| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-------------------------------------------------------------------
 number of iterations   = 26
 primal objective value = -2.83414871e+00
 dual   objective value = -2.83414917e+00
 gap := trace(XZ)       = 3.35e-07
 relative gap           = 5.02e-08
 actual relative gap    = 6.80e-08
 rel. primal infeas     = 1.55e-08
 rel. dual   infeas     = 2.42e-11
 norm(X), norm(y), norm(Z) = 3.5e+01, 1.0e+02, 7.2e+01
 norm(A), norm(b), norm(C) = 2.3e+03, 4.8e+03, 7.8e+01
 Total CPU time (secs)  = 0.39
 CPU time per iteration = 0.01
 termination code       =  0
 DIMACS errors: 2.9e-08  0.0e+00  3.5e-11  0.0e+00  6.8e-08  5.0e-08
-------------------------------------------------------------------

ans =

    2.8341

Iteration   5   Total error is: 0.0068555

 num. of constraints = 85
 dim. of socp   var  = 86,   num. of socp blk  =  1
 dim. of linear var  = 1000
*******************************************************************
   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|1.5e+02|9.4e+07| 1.040589e+05  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.990|8.1e-08|1.7e+00|1.2e+06| 1.053304e+05 -3.675165e+02| 0:0:00| chol  1↙
1
 2|1.000|0.926|5.7e-08|2.2e-01|1.8e+05| 7.330423e+04 -2.650241e+01| 0:0:00| chol  1↙
1
 3|0.768|1.000|2.2e-08|5.1e-02|5.9e+04| 4.122197e+04 -6.249796e+01| 0:0:00| chol  1↙
1
 4|1.000|1.000|2.2e-09|1.5e-02|8.4e+03| 6.671592e+03 -3.898620e+01| 0:0:00| chol  1↙
1
 5|0.906|0.889|2.4e-09|5.8e-03|9.3e+02| 7.620275e+02 -2.859357e+01| 0:0:00| chol  1↙
1
 6|0.188|1.000|1.8e-09|1.4e-03|7.9e+02| 7.399123e+02 -2.281590e+01| 0:0:00| chol  1↙
1
 7|1.000|0.875|1.5e-09|5.3e-04|5.7e+02| 5.449592e+02 -1.197905e+01| 0:0:00| chol  1↙
1
 8|1.000|1.000|9.5e-11|4.1e-05|2.9e+02| 2.799022e+02 -9.221673e+00| 0:0:00| chol  1↙
1
 9|1.000|1.000|2.8e-11|4.1e-06|1.3e+02| 1.209632e+02 -5.754116e+00| 0:0:00| chol  1↙
1
10|1.000|1.000|4.6e-13|4.1e-07|5.5e+01| 5.053240e+01 -4.074094e+00| 0:0:00| chol  1↙
1
11|1.000|1.000|7.2e-13|4.1e-08|2.0e+01| 1.676586e+01 -3.223940e+00| 0:0:00| chol  1↙
1
12|1.000|1.000|1.3e-13|4.1e-09|6.1e+00| 3.284504e+00 -2.856117e+00| 0:0:00| chol  1↙
2
13|1.000|1.000|2.8e-13|4.1e-10|1.6e+00|-1.143830e+00 -2.766615e+00| 0:0:00| chol  1↙
1
14|1.000|1.000|2.7e-11|4.2e-11|3.5e-01|-2.391526e+00 -2.744506e+00| 0:0:00| chol  2↙
2
15|0.938|1.000|5.1e-12|5.6e-12|9.6e-02|-2.643872e+00 -2.739612e+00| 0:0:00| chol  2↙
2
16|1.000|1.000|2.7e-11|1.4e-12|4.7e-02|-2.690207e+00 -2.737575e+00| 0:0:00| chol  2↙
2
17|1.000|1.000|1.0e-10|1.6e-12|1.1e-02|-2.725582e+00 -2.736594e+00| 0:0:00| chol  3↙
3
18|0.960|1.000|1.4e-10|2.3e-12|4.1e-03|-2.732404e+00 -2.736485e+00| 0:0:00| chol  3↙
3
19|1.000|0.927|9.1e-11|3.6e-12|6.0e-04|-2.735784e+00 -2.736387e+00| 0:0:00| chol  4↙
4
20|0.849|0.955|2.8e-11|5.3e-12|1.5e-04|-2.736227e+00 -2.736380e+00| 0:0:00| chol  9↙
12
21|0.932|1.000|3.1e-10|5.5e-12|2.9e-05|-2.736348e+00 -2.736378e+00| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30  30
22|1.000|0.623|3.1e-08|1.0e-11|1.4e-05|-2.736365e+00 -2.736377e+00| 0:0:00| lu 30↙
^18
23|0.556|1.000|8.2e-09|1.2e-11|1.1e-05|-2.736365e+00 -2.736377e+00| 0:0:00| lu 30↙
^17
24|0.418|0.347|8.2e-09|2.7e-11|1.0e-05|-2.736367e+00 -2.736377e+00| 0:0:00|
  stop: progress is too slow
-----------------------------------------------------------------
 number of iterations   = 24
```

```
 primal objective value = -2.73636726e+00
 dual   objective value = -2.73637739e+00
 gap := trace(XZ)       = 1.01e-05
 relative gap           = 1.56e-06
 actual relative gap    = 1.57e-06
 rel. primal infeas     = 8.22e-09
 rel. dual   infeas     = 2.68e-11
 norm(X), norm(y), norm(Z) = 3.5e+01, 1.0e+02, 7.2e+01
 norm(A), norm(b), norm(C) = 2.3e+03, 4.8e+03, 7.8e+01
 Total CPU time (secs)  = 0.31
 CPU time per iteration = 0.01
 termination code       = -5
 DIMACS errors: 1.5e-08  0.0e+00  3.9e-11  0.0e+00  1.6e-06  1.6e-06
------------------------------------------------------------------

ans =

    2.7364

Iteration   6   Total error is: 0.0067353

 num. of constraints = 85
 dim. of socp   var  = 86,   num. of socp blk  =  1
 dim. of linear var  = 1000
*******************************************************************
   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|1.5e+02|9.3e+07| 1.039418e+05  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.990|8.8e-08|1.7e+00|1.2e+06| 1.052345e+05 -3.668707e+02| 0:0:00| chol  1↙
1
 2|1.000|0.926|6.2e-08|2.2e-01|1.8e+05| 7.324700e+04 -2.651051e+01| 0:0:00| chol  1↙
1
 3|0.766|1.000|2.4e-08|5.1e-02|5.9e+04| 4.136003e+04 -6.275268e+01| 0:0:00| chol  1↙
1
 4|1.000|1.000|2.2e-09|1.5e-02|8.3e+03| 6.637611e+03 -3.912967e+01| 0:0:00| chol  1↙
1
 5|0.904|0.887|2.4e-09|5.8e-03|9.4e+02| 7.703881e+02 -2.871963e+01| 0:0:00| chol  1↙
1
 6|0.188|1.000|1.8e-09|1.4e-03|8.0e+02| 7.477533e+02 -2.294176e+01| 0:0:00| chol  1↙
1
 7|1.000|0.862|1.4e-09|5.4e-04|5.7e+02| 5.475150e+02 -1.222250e+01| 0:0:00| chol  1↙
1
 8|1.000|1.000|9.1e-11|4.1e-05|2.9e+02| 2.839835e+02 -9.316403e+00| 0:0:00| chol  1↙
1
 9|1.000|1.000|2.6e-11|4.1e-06|1.3e+02| 1.212662e+02 -5.787447e+00| 0:0:00| chol  1↙
1
10|1.000|1.000|4.1e-13|4.1e-07|5.6e+01| 5.228349e+01 -4.041656e+00| 0:0:00| chol  1↙
1
11|1.000|1.000|2.3e-13|4.1e-08|2.1e+01| 1.772884e+01 -3.151269e+00| 0:0:00| chol  1↙
```

```
1
12|1.000|1.000|7.5e-14|4.1e-09|6.9e+00| 4.109668e+00 -2.749519e+00| 0:0:00| chol  1↙
1
13|1.000|1.000|5.8e-12|4.1e-10|1.7e+00|-9.398615e-01 -2.638331e+00| 0:0:00| chol  1↙
2
14|1.000|1.000|7.0e-13|4.2e-11|4.6e-01|-2.145277e+00 -2.608463e+00| 0:0:00| chol  2↙
2
15|0.885|0.941|4.4e-13|7.4e-12|1.2e-01|-2.471398e+00 -2.595865e+00| 0:0:00| chol  2↙
2
16|1.000|1.000|8.1e-12|1.4e-12|6.9e-02|-2.522138e+00 -2.591458e+00| 0:0:00| chol  2↙
2
17|0.991|1.000|1.4e-11|1.5e-12|1.6e-02|-2.572556e+00 -2.588988e+00| 0:0:00| chol  3↙
3
18|1.000|1.000|2.2e-11|2.3e-12|8.1e-03|-2.580455e+00 -2.588510e+00| 0:0:00| chol  3↙
3
19|1.000|1.000|5.1e-11|3.4e-12|1.6e-03|-2.586423e+00 -2.588065e+00| 0:0:00| chol  4↙
4
20|1.000|0.980|3.9e-10|5.1e-12|4.6e-04|-2.587531e+00 -2.587990e+00| 0:0:00| chol  6↙
6
21|0.918|1.000|9.0e-10|7.6e-12|1.8e-04|-2.587790e+00 -2.587971e+00| 0:0:00| chol 11↙
9
22|1.000|1.000|2.0e-09|1.1e-11|1.1e-04|-2.587860e+00 -2.587968e+00| 0:0:00| chol  7↙
7
23|0.965|1.000|2.5e-09|1.7e-11|2.8e-05|-2.587936e+00 -2.587964e+00| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 13  30
24|0.858|0.439|1.2e-08|3.5e-11|9.2e-06|-2.587954e+00 -2.587964e+00| 0:0:00| lu 12 ^↙
7
25|0.359|0.457|1.2e-08|5.8e-11|7.7e-06|-2.587955e+00 -2.587964e+00| 0:0:00| lu 30↙
30
26|0.126|0.127|2.8e-08|1.1e-10|7.5e-06|-2.587955e+00 -2.587964e+00| 0:0:00|
  stop: progress is too slow
-----------------------------------------------------------------
 number of iterations   = 26
 primal objective value = -2.58795358e+00
 dual   objective value = -2.58796366e+00
 gap := trace(XZ)       = 9.22e-06
 relative gap           = 1.49e-06
 actual relative gap    = 1.63e-06
 rel. primal infeas     = 1.20e-08
 rel. dual   infeas     = 3.52e-11
 norm(X), norm(y), norm(Z) = 3.6e+01, 1.0e+02, 7.3e+01
 norm(A), norm(b), norm(C) = 2.3e+03, 4.8e+03, 7.8e+01
 Total CPU time (secs)  = 0.31
 CPU time per iteration = 0.01
 termination code       = -5
 DIMACS errors: 2.2e-08  0.0e+00  5.1e-11  0.0e+00  1.6e-06  1.5e-06
-----------------------------------------------------------------

ans =

    2.5880

Iteration   7   Total error is: 0.0065478
```

```
 num. of constraints = 85
 dim. of socp   var  = 86,   num. of socp blk  =  1
 dim. of linear var  = 1000
*******************************************************************
   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|1.5e+02|9.1e+07| 1.016789e+05  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.990|7.1e-08|1.7e+00|1.2e+06| 1.028980e+05 -3.929005e+02| 0:0:00| chol  1↙
1
 2|1.000|0.926|5.6e-08|2.2e-01|1.8e+05| 7.141969e+04 -2.884357e+01| 0:0:00| chol  1↙
1
 3|0.766|1.000|2.1e-08|5.1e-02|5.7e+04| 4.029074e+04 -6.478388e+01| 0:0:00| chol  1↙
1
 4|1.000|1.000|2.0e-09|1.5e-02|7.1e+03| 5.566396e+03 -4.109963e+01| 0:0:00| chol  1↙
1
 5|0.831|0.799|3.3e-09|6.7e-03|1.3e+03| 1.115045e+03 -2.939580e+01| 0:0:00| chol  1↙
1
 6|0.246|1.000|2.5e-09|1.4e-03|1.1e+03| 1.059667e+03 -2.289974e+01| 0:0:00| chol  1↙
1
 7|1.000|0.916|8.9e-10|4.9e-04|7.4e+02| 7.151904e+02 -1.343035e+01| 0:0:00| chol  1↙
1
 8|1.000|1.000|6.5e-11|4.1e-05|3.8e+02| 3.733280e+02 -1.090094e+01| 0:0:00| chol  1↙
1
 9|1.000|1.000|3.5e-11|4.1e-06|1.7e+02| 1.644721e+02 -5.273722e+00| 0:0:00| chol  1↙
1
10|1.000|1.000|6.0e-13|4.1e-07|8.3e+01| 7.820302e+01 -4.377002e+00| 0:0:00| chol  1↙
1
11|1.000|1.000|8.0e-14|4.1e-08|3.7e+01| 3.521867e+01 -2.122987e+00| 0:0:00| chol  1↙
1
12|1.000|1.000|1.1e-12|4.1e-09|1.2e+01| 1.042119e+01 -1.770129e+00| 0:0:00| chol  1↙
1
13|1.000|1.000|4.7e-13|4.1e-10|5.2e+00| 3.748430e+00 -1.455804e+00| 0:0:00| chol  1↙
1
14|0.940|1.000|5.8e-12|4.2e-11|8.3e-01|-5.435118e-01 -1.375643e+00| 0:0:00| chol  2↙
2
15|0.946|1.000|7.4e-13|5.3e-12|3.5e-01|-1.008453e+00 -1.354828e+00| 0:0:00| chol  2↙
2
16|1.000|1.000|9.5e-12|1.4e-12|1.9e-01|-1.154591e+00 -1.348800e+00| 0:0:00| chol  2↙
2
17|0.987|1.000|1.2e-12|1.5e-12|5.8e-02|-1.285303e+00 -1.343628e+00| 0:0:00| chol  2↙
2
18|1.000|1.000|6.4e-12|1.0e-12|3.0e-02|-1.312364e+00 -1.342141e+00| 0:0:00| chol  2↙
2
19|1.000|1.000|2.7e-11|1.3e-12|6.8e-03|-1.333977e+00 -1.340762e+00| 0:0:00| chol  3↙
3
20|1.000|1.000|6.7e-11|1.9e-12|2.2e-03|-1.338266e+00 -1.340441e+00| 0:0:00| chol  3↙
3
21|0.906|1.000|2.6e-10|2.9e-12|7.8e-04|-1.339559e+00 -1.340336e+00| 0:0:01| chol  5↙
```

```
4
22|1.000|1.000|4.8e-10|4.3e-12|2.2e-04|-1.340080e+00 -1.340304e+00| 0:0:01| chol  6↙
6
23|0.599|0.814|4.7e-10|7.2e-12|1.2e-04|-1.340177e+00 -1.340298e+00| 0:0:01| chol  6↙
9
24|0.585|0.869|9.5e-10|1.1e-11|7.1e-05|-1.340225e+00 -1.340296e+00| 0:0:01| chol 13↙
18
25|1.000|1.000|2.3e-09|1.4e-11|2.9e-05|-1.340266e+00 -1.340295e+00| 0:0:01| chol 20↙
30
26|0.942|1.000|3.6e-09|2.2e-11|6.9e-06|-1.340288e+00 -1.340295e+00| 0:0:01| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30 ^23
27|0.940|0.970|7.8e-09|3.3e-11|1.8e-06|-1.340292e+00 -1.340295e+00| 0:0:01| lu 30↙
30
28|0.916|0.491|9.1e-08|6.6e-11|1.3e-06|-1.340291e+00 -1.340295e+00| 0:0:01| lu 30↙
30
29|1.000|0.743|5.1e-08|9.0e-11|8.8e-07|-1.340294e+00 -1.340295e+00| 0:0:01| lu 11↙
30
30|0.334|0.401|7.0e-09|1.6e-10|6.3e-07|-1.340294e+00 -1.340295e+00| 0:0:01| lu 30↙
30
31|1.000|0.667|3.5e-09|2.2e-10|5.2e-07|-1.340292e+00 -1.340295e+00| 0:0:01| lu 11↙
30
32|0.162|0.174|2.2e-08|4.3e-10|4.6e-07|-1.340291e+00 -1.340295e+00| 0:0:01|
  stop: progress is too slow
  stop: progress is bad*
------------------------------------------------------------------
 number of iterations   = 32
 primal objective value = -1.34029111e+00
 dual   objective value = -1.34029458e+00
 gap := trace(XZ)       = 4.58e-07
 relative gap           = 1.24e-07
 actual relative gap    = 9.43e-07
 rel. primal infeas     = 2.15e-08
 rel. dual   infeas     = 4.28e-10
 norm(X), norm(y), norm(Z) = 3.7e+01, 1.0e+02, 7.6e+01
 norm(A), norm(b), norm(C) = 2.4e+03, 4.7e+03, 7.8e+01
 Total CPU time (secs)  = 0.86
 CPU time per iteration = 0.03
 termination code       = -5
 DIMACS errors: 4.0e-08  0.0e+00  6.2e-10  0.0e+00  9.4e-07  1.2e-07
------------------------------------------------------------------

ans =

    1.3403

Iteration   8   Total error is: 0.0046924
The total representation error of the testing signals is: 0.037922
>>
```