```
>> 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| 2.407473e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.989|3.8e-07|1.7e+00|2.9e+05| 2.543276e+04 -1.040046e+02| 0:0:00| chol  1↙
1
 2|1.000|0.973|3.9e-07|8.2e-02|2.9e+04| 1.873752e+04 -2.419675e+01| 0:0:00| chol  1↙
1
 3|0.981|1.000|1.3e-07|1.1e-02|2.2e+03| 1.789986e+03 -2.577056e+01| 0:0:00| chol  1↙
1
 4|1.000|1.000|2.3e-08|3.3e-03|2.6e+02| 2.157569e+02 -2.602189e+01| 0:0:00| chol  2↙
2
 5|0.799|0.807|6.0e-09|9.0e-04|5.6e+01| 2.846334e+01 -2.557878e+01| 0:0:00| chol  2↙
1
 6|0.558|0.754|3.5e-09|2.5e-04|4.8e+01| 2.214399e+01 -2.520376e+01| 0:0:00| chol  1↙
1
 7|0.456|1.000|1.8e-09|3.3e-06|4.1e+01| 1.603545e+01 -2.536955e+01| 0:0:00| chol  1↙
2
 8|1.000|1.000|4.2e-11|3.3e-07|2.4e+01|-1.305875e+00 -2.502465e+01| 0:0:00| chol  1↙
1
 9|1.000|1.000|3.7e-12|3.3e-08|1.0e+01|-1.490060e+01 -2.491616e+01| 0:0:00| chol  1↙
1
10|1.000|1.000|5.6e-12|3.3e-09|4.7e+00|-2.008203e+01 -2.473899e+01| 0:0:01| chol  1↙
1
11|1.000|1.000|1.7e-12|3.3e-10|1.5e+00|-2.311608e+01 -2.461586e+01| 0:0:01| chol  1↙
1
12|1.000|1.000|9.0e-13|3.4e-11|6.1e-01|-2.393675e+01 -2.454209e+01| 0:0:01| chol  1↙
1
13|0.948|1.000|1.6e-12|4.3e-12|1.0e-01|-2.439837e+01 -2.450254e+01| 0:0:01| chol  1↙
1
14|1.000|1.000|2.5e-11|1.3e-12|3.0e-02|-2.446844e+01 -2.449799e+01| 0:0:01| chol  1↙
1
15|0.978|0.989|7.5e-11|1.5e-12|3.4e-03|-2.449190e+01 -2.449532e+01| 0:0:01| chol  2↙
2
16|0.944|0.924|4.4e-12|2.4e-12|2.2e-04|-2.449480e+01 -2.449502e+01| 0:0:01| chol  3↙
3
17|1.000|0.977|3.1e-11|1.1e-12|5.4e-05|-2.449495e+01 -2.449500e+01| 0:0:01| chol  2↙
3
18|1.000|1.000|5.0e-11|1.5e-12|2.9e-06|-2.449499e+01 -2.449500e+01| 0:0:01|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-------------------------------------------------------------------
 number of iterations   = 18
```

```
 primal objective value = -2.44949921e+01
 dual   objective value = -2.44949951e+01
 gap := trace(XZ)       = 2.90e-06
 relative gap           = 5.81e-08
 actual relative gap    = 5.85e-08
 rel. primal infeas     = 4.99e-11
 rel. dual   infeas     = 1.50e-12
 norm(X), norm(y), norm(Z) = 7.5e+00, 6.1e+01, 2.2e+01
 norm(A), norm(b), norm(C) = 1.4e+03, 8.8e+02, 7.8e+01
 Total CPU time (secs)  = 0.60
 CPU time per iteration = 0.03
 termination code       =  0
 DIMACS errors: 1.5e-10  0.0e+00  2.2e-12  0.0e+00  5.9e-08  5.8e-08
------------------------------------------------------------------

ans =

   24.4950


 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|5.6e+07| 6.150374e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.989|1.0e-07|1.7e+00|7.2e+05| 6.305054e+04 -1.607048e+02| 0:0:00| chol  1↙
1
 2|1.000|0.930|9.5e-08|1.5e-01|9.6e+04| 4.716633e+04 -8.892277e+00| 0:0:00| chol  1↙
1
 3|1.000|1.000|2.4e-08|1.1e-02|1.4e+04| 1.234772e+04 -2.027854e+01| 0:0:00| chol  1↙
1
 4|0.971|0.990|2.0e-09|3.4e-03|6.2e+02| 5.463184e+02 -1.427269e+01| 0:0:00| chol  1↙
1
 5|0.366|0.807|4.0e-09|9.2e-04|5.2e+02| 4.935147e+02 -9.472510e+00| 0:0:00| chol  1↙
1
 6|0.412|1.000|2.5e-09|3.3e-05|4.4e+02| 4.258833e+02 -9.733281e+00| 0:0:00| chol  1↙
1
 7|1.000|0.902|9.2e-10|6.2e-06|2.0e+02| 1.976986e+02 -6.098218e+00| 0:0:00| chol  1↙
1
 8|1.000|1.000|8.7e-11|3.3e-07|1.2e+02| 1.127963e+02 -5.503949e+00| 0:0:00| chol  1↙
1
 9|1.000|1.000|3.0e-11|3.3e-08|5.1e+01| 4.731389e+01 -3.791679e+00| 0:0:00| chol  1↙
1
10|1.000|1.000|4.4e-12|3.3e-09|2.0e+01| 1.627365e+01 -3.667538e+00| 0:0:00| chol  1↙
1
11|1.000|1.000|2.4e-12|3.3e-10|9.0e+00| 5.714009e+00 -3.309922e+00| 0:0:00| chol  1↙
1
```

```
12|0.927|1.000|1.1e-11|3.4e-11|1.6e+00|-1.592278e+00 -3.225976e+00| 0:0:00| chol  2↙
2
13|1.000|1.000|5.4e-13|4.8e-12|6.8e-01|-2.507564e+00 -3.187040e+00| 0:0:00| chol  2↙
1
14|0.988|1.000|5.4e-11|1.3e-12|2.8e-01|-2.892145e+00 -3.169444e+00| 0:0:00| chol  2↙
2
15|1.000|1.000|8.6e-13|1.5e-12|1.3e-01|-3.035058e+00 -3.161330e+00| 0:0:00| chol  2↙
2
16|1.000|0.930|2.1e-12|1.1e-12|2.1e-02|-3.134460e+00 -3.155682e+00| 0:0:00| chol  2↙
2
17|0.376|0.921|2.6e-11|1.1e-12|1.5e-02|-3.139569e+00 -3.154943e+00| 0:0:00| chol  3↙
3
18|0.976|1.000|1.2e-10|1.5e-12|6.3e-03|-3.148487e+00 -3.154785e+00| 0:0:00| chol  3↙
3
19|0.764|1.000|1.7e-11|2.3e-12|3.0e-03|-3.151609e+00 -3.154574e+00| 0:0:00| chol  3↙
3
20|1.000|1.000|1.7e-10|3.4e-12|7.8e-04|-3.153754e+00 -3.154537e+00| 0:0:00| chol  5↙
5
21|0.704|0.873|5.7e-10|5.5e-12|3.3e-04|-3.154189e+00 -3.154517e+00| 0:0:00| chol  5↙
5
22|0.606|0.929|2.9e-10|8.0e-12|1.5e-04|-3.154366e+00 -3.154516e+00| 0:0:00| chol  8↙
8
23|1.000|1.000|1.6e-09|1.1e-11|2.8e-05|-3.154486e+00 -3.154514e+00| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30 ^14
24|1.000|1.000|1.4e-09|1.7e-11|2.0e-06|-3.154511e+00 -3.154513e+00| 0:0:00| lu *16 ^↙
7
25|1.000|0.882|1.1e-09|2.8e-11|1.7e-07|-3.154514e+00 -3.154513e+00| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-----------------------------------------------------------------
 number of iterations   = 25
 primal objective value = -3.15451392e+00
 dual   objective value = -3.15451341e+00
 gap := trace(XZ)       = 1.66e-07
 relative gap           = 2.28e-08
 actual relative gap    = -6.99e-08
 rel. primal infeas     = 1.12e-09
 rel. dual   infeas     = 2.77e-11
 norm(X), norm(y), norm(Z) = 3.7e+01, 1.0e+02, 7.5e+01
 norm(A), norm(b), norm(C) = 1.9e+03, 2.6e+03, 7.8e+01
 Total CPU time (secs)  = 0.39
 CPU time per iteration = 0.02
 termination code       =  0
 DIMACS errors: 2.4e-09  0.0e+00  4.0e-11  0.0e+00  -7.0e-08  2.3e-08
-----------------------------------------------------------------

ans =

    3.1545

Iteration   2   Total error is: 0.0072118

 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|5.4e+07| 5.893026e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.989|9.3e-08|1.7e+00|6.9e+05| 6.045813e+04 -1.886531e+02| 0:0:00| chol  1↙
1
 2|1.000|0.926|9.0e-08|1.6e-01|9.4e+04| 4.521122e+04 -9.231079e+00| 0:0:00| chol  1↙
1
 3|1.000|1.000|1.8e-08|1.1e-02|1.6e+04| 1.440559e+04 -2.496889e+01| 0:0:00| chol  1↙
1
 4|1.000|1.000|1.9e-09|3.3e-03|1.7e+03| 1.521085e+03 -1.709049e+01| 0:0:00| chol  1↙
1
 5|0.713|0.690|1.4e-08|1.7e-03|5.7e+02| 5.316139e+02 -1.171730e+01| 0:0:00| chol  1↙
1
 6|0.286|1.000|1.1e-08|9.9e-05|5.1e+02| 4.966209e+02 -7.547726e+00| 0:0:00| chol  1↙
1
 7|1.000|1.000|3.8e-10|9.9e-06|3.6e+02| 3.515158e+02 -5.863227e+00| 0:0:00| chol  1↙
1
 8|1.000|1.000|2.1e-10|9.9e-07|1.3e+02| 1.254436e+02 -2.800752e+00| 0:0:00| chol  1↙
1
 9|1.000|1.000|8.0e-12|9.9e-08|7.4e+01| 7.141173e+01 -2.660989e+00| 0:0:00| chol  1↙
1
10|1.000|1.000|2.2e-12|9.9e-09|3.2e+01| 3.063835e+01 -1.171996e+00| 0:0:00| chol  1↙
1
11|1.000|1.000|5.1e-12|9.9e-10|9.1e+00| 8.167702e+00 -9.662041e-01| 0:0:00| chol  1↙
1
12|1.000|1.000|1.6e-12|1.0e-10|3.8e+00| 3.016484e+00 -8.113255e-01| 0:0:00| chol  2↙
1
13|0.925|0.960|3.1e-11|1.4e-11|5.4e-01|-2.264121e-01 -7.619753e-01| 0:0:00| chol  2↙
2
14|0.838|0.887|7.8e-12|4.0e-12|3.2e-01|-4.102760e-01 -7.316141e-01| 0:0:00| chol  2↙
2
15|1.000|1.000|1.7e-11|1.7e-12|1.7e-01|-5.511175e-01 -7.259028e-01| 0:0:00| chol  2↙
2
16|1.000|1.000|3.3e-12|2.3e-12|4.4e-02|-6.743904e-01 -7.181416e-01| 0:0:00| chol  2↙
2
17|1.000|1.000|9.8e-12|1.0e-12|1.8e-02|-6.978716e-01 -7.163538e-01| 0:0:00| chol  2↙
2
18|0.957|0.961|1.1e-11|1.5e-12|2.5e-03|-7.124879e-01 -7.149624e-01| 0:0:00| chol  3↙
3
19|0.994|0.999|9.4e-11|2.1e-12|5.8e-04|-7.142098e-01 -7.147930e-01| 0:0:00| chol  5↙
5
20|1.000|1.000|2.6e-10|3.2e-12|2.5e-04|-7.145088e-01 -7.147618e-01| 0:0:00| chol  5↙
5
21|1.000|1.000|4.0e-10|4.8e-12|6.4e-05|-7.146799e-01 -7.147434e-01| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 22 ^17
22|0.446|0.442|2.8e-08|9.9e-12|5.3e-05|-7.146911e-01 -7.147425e-01| 0:0:00| lu 30↙
```

```
^21
23|1.000|1.000|4.0e-08|1.1e-11|3.8e-05|-7.146990e-01 -7.147408e-01| 0:0:00| lu 30↙
3
24|1.000|1.000|5.0e-09|1.6e-11|1.5e-05|-7.147232e-01 -7.147388e-01| 0:0:00| lu 30↙
^12
25|1.000|1.000|1.4e-08|2.4e-11|6.2e-06|-7.147339e-01 -7.147379e-01| 0:0:00| lu 30↙
^12
26|1.000|1.000|4.5e-09|3.7e-11|2.0e-06|-7.147358e-01 -7.147375e-01| 0:0:00| lu 30 ^↙
4
27|1.000|0.814|9.9e-09|6.2e-11|8.1e-07|-7.147388e-01 -7.147374e-01| 0:0:00| lu 30↙
30
28|1.000|0.818|9.1e-09|9.4e-11|5.3e-07|-7.147364e-01 -7.147374e-01| 0:0:00| lu 11↙
30
29|0.089|0.100|1.7e-08|2.1e-10|4.9e-07|-7.147326e-01 -7.147374e-01| 0:0:00| lu 30↙
^20
30|0.587|0.369|2.1e-08|3.2e-10|4.4e-07|-7.147374e-01 -7.147374e-01| 0:0:00|
  stop: progress is too slow
-----------------------------------------------------------------
 number of iterations   = 30
 primal objective value = -7.14736429e-01
 dual   objective value = -7.14737414e-01
 gap := trace(XZ)       = 5.34e-07
 relative gap           = 2.20e-07
 actual relative gap    = 4.06e-07
 rel. primal infeas     = 9.10e-09
 rel. dual   infeas     = 9.35e-11
 norm(X), norm(y), norm(Z) = 3.8e+01, 1.1e+02, 7.9e+01
 norm(A), norm(b), norm(C) = 2.0e+03, 2.9e+03, 7.8e+01
 Total CPU time (secs)  = 0.43
 CPU time per iteration = 0.01
 termination code       = -5
 DIMACS errors: 1.8e-08  0.0e+00  1.4e-10  0.0e+00  4.1e-07  2.2e-07
-----------------------------------------------------------------

ans =

    0.7147

Iteration   3   Total error is: 0.0033997

 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|5.3e+07| 5.865130e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.989|9.6e-08|1.7e+00|6.8e+05| 6.018682e+04 -1.779107e+02| 0:0:00| chol  1↙
1
```

```
 2|1.000|0.927|9.2e-08|1.6e-01|9.3e+04| 4.499445e+04 -1.023334e+01| 0:0:00| chol  1↙
1
 3|1.000|1.000|1.9e-08|1.1e-02|1.5e+04| 1.352458e+04 -2.446651e+01| 0:0:00| chol  1↙
1
 4|0.995|1.000|2.0e-09|3.3e-03|8.0e+02| 7.075975e+02 -1.684898e+01| 0:0:00| chol  1↙
1
 5|0.519|0.553|1.2e-08|2.0e-03|6.1e+02| 5.666429e+02 -1.082523e+01| 0:0:00| chol  1↙
1
 6|0.761|1.000|4.9e-09|9.9e-05|4.4e+02| 4.350975e+02 -6.987674e+00| 0:0:00| chol  1↙
1
 7|1.000|1.000|6.2e-10|9.9e-06|2.7e+02| 2.605979e+02 -4.563085e+00| 0:0:00| chol  1↙
1
 8|1.000|1.000|1.1e-10|9.9e-07|1.2e+02| 1.171836e+02 -2.769252e+00| 0:0:00| chol  1↙
1
 9|1.000|1.000|1.9e-11|9.9e-08|5.4e+01| 5.296077e+01 -1.400736e+00| 0:0:00| chol  1↙
1
10|1.000|1.000|5.4e-13|9.9e-09|2.0e+01| 1.883471e+01 -8.139096e-01| 0:0:00| chol  1↙
1
11|1.000|1.000|3.7e-13|9.9e-10|5.6e+00| 5.069198e+00 -4.965484e-01| 0:0:00| chol  1↙
1
12|0.989|1.000|4.7e-12|1.0e-10|1.0e+00| 6.045302e-01 -4.276822e-01| 0:0:00| chol  2↙
2
13|1.000|0.966|1.1e-12|1.4e-11|4.2e-01| 2.495447e-02 -3.940190e-01| 0:0:00| chol  2↙
2
14|0.835|1.000|1.1e-12|2.0e-12|2.3e-01|-1.592695e-01 -3.858961e-01| 0:0:00| chol  2↙
1
15|1.000|1.000|2.6e-11|1.1e-12|1.1e-01|-2.684962e-01 -3.810302e-01| 0:0:00| chol  2↙
2
16|1.000|1.000|5.1e-12|1.5e-12|3.3e-02|-3.435892e-01 -3.766268e-01| 0:0:00| chol  2↙
2
17|1.000|1.000|1.0e-11|1.0e-12|1.3e-02|-3.622473e-01 -3.752186e-01| 0:0:00| chol  2↙
2
18|0.986|1.000|7.3e-12|1.5e-12|2.4e-03|-3.719404e-01 -3.743636e-01| 0:0:00| chol  3↙
3
19|1.000|1.000|8.9e-11|1.5e-12|9.6e-04|-3.732902e-01 -3.742473e-01| 0:0:00| chol  3↙
3
20|1.000|1.000|1.9e-10|2.2e-12|2.8e-04|-3.739027e-01 -3.741867e-01| 0:0:00| chol  3↙
3
21|1.000|1.000|2.3e-10|3.3e-12|7.7e-05|-3.740913e-01 -3.741679e-01| 0:0:00| chol  9↙
9
22|1.000|1.000|4.5e-10|4.9e-12|2.3e-05|-3.741400e-01 -3.741633e-01| 0:0:00| chol 25↙
30
23|1.000|1.000|7.3e-10|7.4e-12|8.3e-06|-3.741536e-01 -3.741620e-01| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30  30
24|1.000|0.901|8.7e-09|1.2e-11|1.3e-06|-3.741604e-01 -3.741615e-01| 0:0:00| lu 30↙
^11
25|0.533|0.864|1.4e-08|1.8e-11|1.0e-06|-3.741600e-01 -3.741615e-01| 0:0:00| lu 30↙
^24
26|0.020|0.031|6.9e-09|4.2e-11|1.0e-06|-3.741628e-01 -3.741615e-01| 0:0:00| lu 30↙
30
27|0.034|0.043|6.7e-09|7.8e-11|1.0e-06|-3.741636e-01 -3.741615e-01| 0:0:00|
  stop: progress is bad
  stop: steps too short consecutively
```

```
-----------------------------------------------------------------
 number of iterations   = 27
 primal objective value = -3.74160034e-01
 dual   objective value = -3.74161476e-01
 gap := trace(XZ)       = 1.02e-06
 relative gap           = 5.83e-07
 actual relative gap    = 8.24e-07
 rel. primal infeas     = 1.36e-08
 rel. dual   infeas     = 1.82e-11
 norm(X), norm(y), norm(Z) = 3.8e+01, 1.0e+02, 7.9e+01
 norm(A), norm(b), norm(C) = 2.0e+03, 2.8e+03, 7.8e+01
 Total CPU time (secs)  = 0.32
 CPU time per iteration = 0.01
 termination code       = -5
 DIMACS errors: 2.7e-08  0.0e+00  2.6e-11  0.0e+00  8.2e-07  5.8e-07
-----------------------------------------------------------------

ans =

    0.3742

Iteration   4   Total error is: 0.0024282

 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|5.3e+07| 5.805869e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.989|9.7e-08|1.7e+00|6.8e+05| 5.959619e+04 -1.692020e+02| 0:0:00| chol  1↙
1
 2|1.000|0.928|9.3e-08|1.6e-01|9.1e+04| 4.453388e+04 -1.082430e+01| 0:0:00| chol  1↙
1
 3|1.000|1.000|2.0e-08|1.1e-02|1.4e+04| 1.264812e+04 -2.365145e+01| 0:0:00| chol  1↙
1
 4|0.978|0.997|1.9e-09|3.3e-03|6.7e+02| 5.935149e+02 -1.671902e+01| 0:0:00| chol  1↙
1
 5|0.357|0.716|6.8e-09|1.2e-03|5.7e+02| 5.397826e+02 -1.017039e+01| 0:0:00| chol  1↙
1
 6|0.387|1.000|4.3e-09|3.3e-05|4.8e+02| 4.712790e+02 -9.581127e+00| 0:0:00| chol  1↙
1
 7|1.000|0.886|1.4e-09|6.7e-06|2.4e+02| 2.359013e+02 -4.809197e+00| 0:0:00| chol  1↙
1
 8|1.000|1.000|7.4e-11|3.3e-07|1.5e+02| 1.413236e+02 -3.880931e+00| 0:0:00| chol  1↙
1
 9|1.000|1.000|3.9e-11|3.3e-08|6.1e+01| 5.933787e+01 -1.315575e+00| 0:0:00| chol  1↙
1
10|1.000|1.000|8.9e-12|3.3e-09|2.6e+01| 2.469862e+01 -1.095558e+00| 0:0:00| chol  1↙
```

```
1
11|1.000|1.000|8.1e-13|3.3e-10|1.1e+01| 1.073495e+01 -4.589939e-01| 0:0:00| chol  1↙
1
12|0.945|1.000|3.8e-12|3.4e-11|2.2e+00| 1.883971e+00 -3.328391e-01| 0:0:00| chol  1↙
1
13|1.000|1.000|1.1e-11|4.3e-12|8.9e-01| 6.017787e-01 -2.904964e-01| 0:0:00| chol  1↙
2
14|0.865|0.923|1.9e-12|2.1e-12|2.2e-01|-4.970133e-02 -2.696176e-01| 0:0:00| chol  2↙
2
15|1.000|1.000|5.5e-12|1.0e-12|1.3e-01|-1.330540e-01 -2.627400e-01| 0:0:00| chol  2↙
2
16|0.978|1.000|3.5e-12|1.1e-12|4.0e-02|-2.185251e-01 -2.587871e-01| 0:0:00| chol  2↙
2
17|1.000|1.000|5.4e-12|1.0e-12|1.8e-02|-2.390376e-01 -2.574208e-01| 0:0:00| chol  2↙
2
18|1.000|1.000|3.6e-12|1.1e-12|4.9e-03|-2.516187e-01 -2.565138e-01| 0:0:00| chol  3↙
3
19|1.000|1.000|1.8e-11|1.0e-12|1.5e-03|-2.547398e-01 -2.562617e-01| 0:0:00| chol  3↙
3
20|1.000|1.000|2.8e-10|1.5e-12|5.4e-04|-2.556578e-01 -2.561966e-01| 0:0:00| chol  4↙
4
21|0.677|1.000|2.1e-10|2.3e-12|3.4e-04|-2.558368e-01 -2.561771e-01| 0:0:00| chol  5↙
5
22|1.000|1.000|1.9e-10|3.4e-12|1.3e-04|-2.560420e-01 -2.561689e-01| 0:0:00| chol  6↙
5
23|1.000|1.000|4.8e-10|5.1e-12|5.5e-05|-2.561087e-01 -2.561639e-01| 0:0:00| chol  7↙
6
24|1.000|1.000|1.0e-09|7.6e-12|1.8e-05|-2.561439e-01 -2.561620e-01| 0:0:00| chol 10↙
13
25|1.000|0.943|1.9e-09|1.2e-11|7.9e-06|-2.561536e-01 -2.561614e-01| 0:0:00| chol 12↙
12
26|1.000|1.000|3.2e-09|1.7e-11|2.5e-06|-2.561590e-01 -2.561612e-01| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30 ^15
27|1.000|0.822|2.2e-09|2.9e-11|7.8e-07|-2.561602e-01 -2.561612e-01| 0:0:00| lu 30↙
30
28|0.723|0.519|9.5e-09|5.2e-11|2.8e-07|-2.561604e-01 -2.561612e-01| 0:0:00| lu 30↙
30
29|0.291|0.616|8.0e-09|7.8e-11|2.2e-07|-2.561610e-01 -2.561612e-01| 0:0:00| lu 30↙
30
30|1.000|0.818|5.2e-09|1.0e-10|2.0e-07|-2.561622e-01 -2.561612e-01| 0:0:00| lu 11↙
^27
31|0.193|0.227|1.3e-08|2.1e-10|1.7e-07|-2.561601e-01 -2.561612e-01| 0:0:00|
  stop: progress is too slow
  stop: progress is bad*
-------------------------------------------------------------------
 number of iterations   = 31
 primal objective value = -2.56160096e-01
 dual   objective value = -2.56161179e-01
 gap := trace(XZ)       = 1.71e-07
 relative gap           = 1.13e-07
 actual relative gap    = 7.16e-07
 rel. primal infeas     = 1.33e-08
 rel. dual   infeas     = 2.08e-10
```

```
 norm(X), norm(y), norm(Z) = 3.8e+01, 1.0e+02, 7.8e+01
 norm(A), norm(b), norm(C) = 2.0e+03, 2.7e+03, 7.8e+01
 Total CPU time (secs)  = 0.42
 CPU time per iteration = 0.01
 termination code       = -5
 DIMACS errors: 2.6e-08  0.0e+00  3.0e-10  0.0e+00  7.2e-07  1.1e-07
------------------------------------------------------------------

ans =

    0.2562

Iteration   5   Total error is: 0.0019804

 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|5.2e+07| 5.748273e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.989|9.8e-08|1.7e+00|6.7e+05| 5.902103e+04 -1.632777e+02| 0:0:00| chol  1↙
1
 2|1.000|0.929|9.4e-08|1.5e-01|9.0e+04| 4.408319e+04 -1.119831e+01| 0:0:00| chol  1↙
1
 3|1.000|1.000|2.0e-08|1.1e-02|1.4e+04| 1.190917e+04 -2.290093e+01| 0:0:00| chol  1↙
1
 4|0.970|0.990|2.0e-09|3.4e-03|6.4e+02| 5.625716e+02 -1.666726e+01| 0:0:00| chol  1↙
1
 5|0.317|0.778|5.7e-09|1.0e-03|5.5e+02| 5.194352e+02 -1.004150e+01| 0:0:00| chol  1↙
1
 6|0.388|1.000|3.5e-09|3.3e-05|4.6e+02| 4.537415e+02 -1.004808e+01| 0:0:00| chol  1↙
1
 7|1.000|0.853|1.6e-09|7.6e-06|2.1e+02| 2.041777e+02 -4.902839e+00| 0:0:00| chol  1↙
1
 8|1.000|1.000|1.0e-10|3.3e-07|1.3e+02| 1.296087e+02 -3.494652e+00| 0:0:00| chol  1↙
1
 9|1.000|1.000|3.1e-11|3.3e-08|5.3e+01| 5.157795e+01 -1.250894e+00| 0:0:00| chol  1↙
1
10|1.000|1.000|2.3e-12|3.3e-09|2.3e+01| 2.183612e+01 -8.851514e-01| 0:0:00| chol  1↙
1
11|1.000|1.000|4.3e-14|3.3e-10|8.6e+00| 8.185652e+00 -3.674261e-01| 0:0:00| chol  1↙
1
12|0.974|1.000|1.6e-12|3.4e-11|1.7e+00| 1.476894e+00 -2.504181e-01| 0:0:00| chol  2↙
2
13|1.000|1.000|2.2e-13|4.3e-12|7.0e-01| 4.890786e-01 -2.138405e-01| 0:0:00| chol  2↙
2
14|0.870|0.920|4.6e-13|1.6e-12|1.8e-01|-1.849199e-02 -1.964357e-01| 0:0:00| chol  2↙
2
```

```
15|1.000|1.000|3.4e-12|1.0e-12|1.0e-01|-9.063143e-02 -1.915368e-01| 0:0:00| chol  2↙
2
16|0.985|1.000|9.8e-12|1.0e-12|2.6e-02|-1.617968e-01 -1.880993e-01| 0:0:00| chol  2↙
2
17|1.000|1.000|2.9e-11|1.5e-12|1.2e-02|-1.752363e-01 -1.872958e-01| 0:0:00| chol  2↙
2
18|0.994|1.000|7.8e-12|2.3e-12|2.2e-03|-1.844428e-01 -1.866807e-01| 0:0:00| chol  3↙
4
19|1.000|0.981|2.2e-10|1.6e-12|9.9e-04|-1.856324e-01 -1.866252e-01| 0:0:00| chol  3↙
4
20|0.961|1.000|1.3e-10|2.3e-12|4.0e-04|-1.861986e-01 -1.865946e-01| 0:0:00| chol  5↙
4
21|1.000|1.000|1.1e-09|3.5e-12|2.5e-04|-1.863429e-01 -1.865879e-01| 0:0:00| chol  4↙
5
22|1.000|1.000|3.5e-10|5.2e-12|5.7e-05|-1.865252e-01 -1.865819e-01| 0:0:00| chol  8↙
8
23|1.000|1.000|1.8e-09|7.9e-12|2.2e-05|-1.865587e-01 -1.865813e-01| 0:0:00| chol  9↙
8
24|1.000|1.000|3.1e-10|1.2e-11|3.6e-06|-1.865775e-01 -1.865810e-01| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 14  30
25|1.000|1.000|4.9e-09|1.8e-11|7.6e-07|-1.865803e-01 -1.865810e-01| 0:0:00| lu 14 ^↙
8
26|0.910|0.892|8.6e-09|2.8e-11|1.7e-07|-1.865808e-01 -1.865810e-01| 0:0:00| lu *10↙
30
27|0.081|0.185|9.8e-09|6.3e-11|1.6e-07|-1.865809e-01 -1.865810e-01| 0:0:00| lu 11↙
^23
28|0.009|0.082|1.1e-08|1.2e-10|1.6e-07|-1.865807e-01 -1.865810e-01| 0:0:00|
  stop: progress is too slow
  stop: progress is bad
------------------------------------------------------------------
 number of iterations   = 28
 primal objective value = -1.86580764e-01
 dual   objective value = -1.86580978e-01
 gap := trace(XZ)       = 1.66e-07
 relative gap           = 1.21e-07
 actual relative gap    = 1.56e-07
 rel. primal infeas     = 8.57e-09
 rel. dual   infeas     = 2.84e-11
 norm(X), norm(y), norm(Z) = 3.8e+01, 1.0e+02, 7.8e+01
 norm(A), norm(b), norm(C) = 1.9e+03, 2.6e+03, 7.8e+01
 Total CPU time (secs)  = 0.39
 CPU time per iteration = 0.01
 termination code       = -5
 DIMACS errors: 1.7e-08  0.0e+00  4.1e-11  0.0e+00  1.6e-07  1.2e-07
------------------------------------------------------------------

ans =

    0.1866

Iteration   6   Total error is: 0.0016597

 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|5.2e+07| 5.695536e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.989|9.8e-08|1.7e+00|6.6e+05| 5.849466e+04 -1.590065e+02| 0:0:00| chol  1↙
1
 2|1.000|0.930|9.4e-08|1.5e-01|8.8e+04| 4.367253e+04 -1.145298e+01| 0:0:00| chol  1↙
1
 3|1.000|1.000|2.1e-08|1.1e-02|1.3e+04| 1.130093e+04 -2.226497e+01| 0:0:00| chol  1↙
1
 4|0.969|0.986|2.1e-09|3.4e-03|5.8e+02| 5.035609e+02 -1.659738e+01| 0:0:00| chol  1↙
1
 5|0.275|0.833|5.1e-09|8.4e-04|5.0e+02| 4.730870e+02 -9.642111e+00| 0:0:00| chol  1↙
1
 6|0.414|1.000|2.8e-09|3.3e-05|4.2e+02| 4.115893e+02 -1.030963e+01| 0:0:00| chol  1↙
1
 7|1.000|0.844|1.7e-09|7.9e-06|1.7e+02| 1.685617e+02 -4.678030e+00| 0:0:00| chol  1↙
1
 8|1.000|1.000|1.3e-10|3.3e-07|1.1e+02| 1.099150e+02 -2.940935e+00| 0:0:00| chol  1↙
1
 9|1.000|1.000|2.6e-11|3.3e-08|4.1e+01| 3.979058e+01 -1.082284e+00| 0:0:00| chol  1↙
1
10|1.000|1.000|2.1e-12|3.3e-09|1.8e+01| 1.724720e+01 -6.545531e-01| 0:0:00| chol  1↙
1
11|1.000|1.000|6.1e-14|3.3e-10|5.1e+00| 4.801838e+00 -2.611273e-01| 0:0:00| chol  1↙
1
12|1.000|1.000|4.9e-12|3.4e-11|1.2e+00| 1.039047e+00 -1.907975e-01| 0:0:00| chol  2↙
2
13|1.000|1.000|3.3e-13|4.3e-12|4.0e-01| 2.421430e-01 -1.586880e-01| 0:0:00| chol  2↙
2
14|0.874|1.000|6.2e-13|1.3e-12|1.6e-01| 1.328363e-02 -1.481156e-01| 0:0:00| chol  2↙
2
15|1.000|1.000|3.0e-12|1.0e-12|7.8e-02|-6.657214e-02 -1.449708e-01| 0:0:00| chol  2↙
2
16|0.999|1.000|5.5e-12|1.0e-12|2.0e-02|-1.225258e-01 -1.422375e-01| 0:0:00| chol  2↙
2
17|1.000|1.000|8.2e-12|1.1e-12|8.8e-03|-1.328225e-01 -1.416190e-01| 0:0:00| chol  2↙
2
18|0.990|0.972|1.7e-11|1.7e-12|1.5e-03|-1.396643e-01 -1.412109e-01| 0:0:00| chol  3↙
4
19|0.847|0.876|2.2e-10|2.7e-12|8.5e-04|-1.403553e-01 -1.412030e-01| 0:0:00| chol  4↙
3
20|1.000|0.985|9.0e-11|3.7e-12|2.3e-04|-1.409426e-01 -1.411772e-01| 0:0:00| chol  4↙
5
21|0.742|1.000|3.1e-10|5.5e-12|1.2e-04|-1.410514e-01 -1.411742e-01| 0:0:00| chol  6↙
5
22|0.894|1.000|1.7e-10|8.3e-12|2.9e-05|-1.411442e-01 -1.411730e-01| 0:0:00| chol 18↙
```

```
22
23|0.941|1.000|1.1e-09|1.2e-11|3.7e-06|-1.411691e-01 -1.411729e-01| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30  30
24|0.974|1.000|3.1e-09|1.9e-11|5.5e-07|-1.411723e-01 -1.411729e-01| 0:0:00| lu 11↙
30
25|0.192|0.330|2.6e-09|4.1e-11|4.5e-07|-1.411717e-01 -1.411729e-01| 0:0:00| lu 30↙
30
26|0.038|0.134|5.3e-09|7.7e-11|4.5e-07|-1.411723e-01 -1.411729e-01| 0:0:00|
  stop: progress is too slow
  stop: progress is bad
-----------------------------------------------------------------
 number of iterations   = 26
 primal objective value = -1.41172272e-01
 dual   objective value = -1.41172854e-01
 gap := trace(XZ)       = 5.48e-07
 relative gap           = 4.28e-07
 actual relative gap    = 4.54e-07
 rel. primal infeas     = 3.09e-09
 rel. dual   infeas     = 1.87e-11
 norm(X), norm(y), norm(Z) = 3.8e+01, 1.0e+02, 7.8e+01
 norm(A), norm(b), norm(C) = 1.9e+03, 2.6e+03, 7.8e+01
 Total CPU time (secs)  = 0.34
 CPU time per iteration = 0.01
 termination code       = -5
 DIMACS errors: 6.1e-09  0.0e+00  2.7e-11  0.0e+00  4.5e-07  4.3e-07
-----------------------------------------------------------------

ans =

    0.1412

Iteration   7   Total error is: 0.0014107

 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|5.1e+07| 5.648250e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.989|9.7e-08|1.7e+00|6.6e+05| 5.802195e+04 -1.553804e+02| 0:0:00| chol  1↙
1
 2|1.000|0.930|9.4e-08|1.5e-01|8.7e+04| 4.330243e+04 -1.165122e+01| 0:0:00| chol  1↙
1
 3|1.000|1.000|2.1e-08|1.1e-02|1.2e+04| 1.078273e+04 -2.172537e+01| 0:0:00| chol  1↙
1
 4|0.970|0.985|2.3e-09|3.4e-03|5.2e+02| 4.485072e+02 -1.653350e+01| 0:0:00| chol  1↙
1
```

```
 5|0.240|0.904|4.7e-09|6.3e-04|4.5e+02| 4.271867e+02 -9.118234e+00| 0:0:00| chol  1↙
1
 6|0.459|1.000|2.2e-09|3.3e-05|3.8e+02| 3.682243e+02 -1.033018e+01| 0:0:00| chol  1↙
1
 7|1.000|0.863|1.7e-09|7.3e-06|1.5e+02| 1.454091e+02 -4.333525e+00| 0:0:00| chol  1↙
1
 8|1.000|1.000|9.4e-11|3.3e-07|9.5e+01| 9.268655e+01 -2.642408e+00| 0:0:00| chol  1↙
1
 9|1.000|1.000|2.2e-11|3.3e-08|3.4e+01| 3.290962e+01 -9.370893e-01| 0:0:00| chol  1↙
1
10|1.000|1.000|9.7e-13|3.3e-09|1.4e+01| 1.389075e+01 -5.391696e-01| 0:0:00| chol  1↙
1
11|1.000|1.000|1.3e-13|3.3e-10|4.0e+00| 3.826121e+00 -2.106758e-01| 0:0:00| chol  1↙
2
12|1.000|1.000|3.5e-13|3.4e-11|9.6e-01| 8.105992e-01 -1.508238e-01| 0:0:00| chol  2↙
2
13|1.000|1.000|6.6e-13|4.3e-12|3.4e-01| 2.190576e-01 -1.228230e-01| 0:0:00| chol  2↙
2
14|0.888|1.000|1.1e-12|1.3e-12|1.4e-01| 2.675859e-02 -1.146938e-01| 0:0:00| chol  2↙
2
15|1.000|1.000|4.2e-12|1.0e-12|6.8e-02|-4.347617e-02 -1.115703e-01| 0:0:00| chol  2↙
2
16|0.997|1.000|3.0e-12|1.0e-12|1.7e-02|-9.238977e-02 -1.090347e-01| 0:0:00| chol  2↙
3
17|1.000|1.000|2.2e-11|1.0e-12|7.5e-03|-1.010034e-01 -1.085012e-01| 0:0:00| chol  2↙
2
18|0.987|0.953|1.3e-11|1.5e-12|1.5e-03|-1.066800e-01 -1.081582e-01| 0:0:00| chol  3↙
4
19|0.735|0.979|1.1e-10|2.3e-12|8.9e-04|-1.072539e-01 -1.081458e-01| 0:0:00| chol  3↙
3
20|1.000|1.000|1.1e-10|3.4e-12|2.6e-04|-1.078599e-01 -1.081217e-01| 0:0:00| chol  4↙
5
21|0.840|1.000|2.5e-10|5.1e-12|1.3e-04|-1.079864e-01 -1.081171e-01| 0:0:00| chol  5↙
5
22|0.955|1.000|1.7e-10|7.6e-12|2.8e-05|-1.080878e-01 -1.081153e-01| 0:0:00| chol 11↙
9
23|0.993|1.000|8.4e-10|1.1e-11|3.0e-06|-1.081121e-01 -1.081150e-01| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30 ^28
24|0.982|0.847|5.8e-09|1.9e-11|6.5e-07|-1.081151e-01 -1.081150e-01| 0:0:00| lu 24↙
30
25|0.338|0.330|5.1e-09|3.8e-11|5.7e-07|-1.081150e-01 -1.081150e-01| 0:0:00| lu 27 ^↙
9
26|0.198|0.337|4.9e-09|6.4e-11|5.3e-07|-1.081151e-01 -1.081150e-01| 0:0:00|
  stop: progress is too slow
-----------------------------------------------------------------
 number of iterations   = 26
 primal objective value = -1.08115070e-01
 dual   objective value = -1.08115018e-01
 gap := trace(XZ)       = 6.50e-07
 relative gap           = 5.34e-07
 actual relative gap    = -4.28e-08
 rel. primal infeas     = 5.83e-09
 rel. dual   infeas     = 1.88e-11
```

```
 norm(X), norm(y), norm(Z) = 3.8e+01, 1.0e+02, 7.8e+01
 norm(A), norm(b), norm(C) = 1.9e+03, 2.5e+03, 7.8e+01
 Total CPU time (secs)  = 0.32
 CPU time per iteration = 0.01
 termination code       = -5
 DIMACS errors: 1.2e-08  0.0e+00  2.7e-11  0.0e+00  -4.3e-08  5.3e-07
------------------------------------------------------------------

ans =

    0.1081

Iteration   8   Total error is: 0.0011967
The total representation error of the testing signals is: 0.012828
>>
```