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

 num. of constraints = 117
 dim. of socp   var  = 118,   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|4.9e+02|8.3e+07| 2.949465e+04  0.000000e+00| 0:0:00| chol  1✔
1
 1|1.000|0.989|1.2e-07|5.6e+00|9.8e+05| 3.139786e+04 -3.862672e+02| 0:0:00| chol  1✔
1
 2|1.000|0.961|1.7e-07|2.5e-01|6.8e+04| 2.908294e+04 -1.469465e+01| 0:0:00| chol  1✔
1
 3|0.957|1.000|1.6e-08|1.0e-02|1.5e+04| 1.468100e+04 -2.223350e+01| 0:0:00| chol  1✔
1
 4|1.000|1.000|1.8e-09|3.0e-03|1.1e+03| 1.021366e+03 -1.563872e+01| 0:0:00| chol  1✔
1
 5|0.945|0.996|1.5e-10|3.1e-04|5.8e+01| 4.333825e+01 -1.473018e+01| 0:0:00| chol  2✔
1
 6|0.733|0.331|1.3e-09|2.2e-04|4.8e+01| 3.369709e+01 -1.407990e+01| 0:0:00| chol  1✔
1
 7|0.870|0.999|3.9e-10|3.1e-06|3.6e+01| 2.175531e+01 -1.409864e+01| 0:0:00| chol  1✔
1
 8|1.000|1.000|5.4e-11|3.0e-07|2.4e+01| 1.059873e+01 -1.376152e+01| 0:0:00| chol  1✔
1
 9|0.854|0.949|6.8e-12|4.4e-08|5.7e+00|-7.607169e+00 -1.329702e+01| 0:0:00| chol  2✔
2
10|1.000|1.000|1.0e-12|3.0e-09|2.6e+00|-1.066824e+01 -1.325301e+01| 0:0:00| chol  2✔
2
11|0.898|1.000|2.6e-13|3.0e-10|4.3e-01|-1.282043e+01 -1.324547e+01| 0:0:01| chol  2✔
2
12|1.000|1.000|1.1e-12|3.1e-11|1.3e-01|-1.311665e+01 -1.324354e+01| 0:0:01| chol  2✔
2
13|0.936|0.968|1.6e-11|4.9e-12|9.0e-03|-1.323420e+01 -1.324323e+01| 0:0:01| chol  3✔
3
14|1.000|0.994|7.1e-11|1.8e-12|1.1e-03|-1.324215e+01 -1.324321e+01| 0:0:01| chol  3✔
3
15|0.980|0.981|2.2e-11|2.3e-12|2.1e-05|-1.324318e+01 -1.324320e+01| 0:0:01| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30    1
16|1.000|1.000|1.5e-11|3.4e-12|1.3e-06|-1.324320e+01 -1.324320e+01| 0:0:01|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-------------------------------------------------------------------
 number of iterations   = 16
 primal objective value = -1.32432025e+01
 dual   objective value = -1.32432039e+01
 gap := trace(XZ)       = 1.32e-06
```

```
 relative gap          = 4.80e-08
 actual relative gap   = 4.82e-08
 rel. primal infeas    = 1.54e-11
 rel. dual   infeas    = 3.38e-12
 norm(X), norm(y), norm(Z) = 2.8e+01, 9.0e+01, 5.7e+01
 norm(A), norm(b), norm(C) = 5.5e+03, 3.5e+03, 7.7e+01
 Total CPU time (secs) = 0.57
 CPU time per iteration = 0.04
 termination code      =  0
 DIMACS errors: 4.2e-11  0.0e+00  4.8e-12  0.0e+00  4.8e-08  4.8e-08
-------------------------------------------------------------------

ans =

   13.2432


 num. of constraints = 117
 dim. of socp  var  = 118,   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|4.9e+02|1.4e+08| 4.895719e+04  0.000000e+00| 0:0:00| chol  1✔
1
 1|1.000|0.988|7.6e-08|5.8e+00|1.7e+06| 5.121363e+04 -5.356688e+02| 0:0:00| chol  1✔
1
 2|1.000|0.963|1.0e-07|2.5e-01|1.1e+05| 4.756488e+04 -1.142602e+01| 0:0:00| chol  1✔
1
 3|0.921|1.000|1.3e-08|1.0e-02|2.7e+04| 2.577793e+04 -2.598062e+01| 0:0:00| chol  1✔
1
 4|1.000|1.000|1.1e-09|3.0e-03|2.9e+03| 2.837630e+03 -1.412520e+01| 0:0:00| chol  1✔
1
 5|0.954|0.979|2.8e-10|3.5e-04|1.3e+02| 1.213194e+02 -1.161806e+01| 0:0:00| chol  1✔
1
 6|0.361|0.521|6.5e-10|1.9e-04|1.2e+02| 1.099707e+02 -9.651053e+00| 0:0:00| chol  1✔
1
 7|0.492|0.835|3.8e-10|3.3e-05|1.0e+02| 9.505224e+01 -9.673810e+00| 0:0:00| chol  1✔
1
 8|0.581|1.000|1.7e-10|3.0e-07|8.6e+01| 7.731342e+01 -8.717549e+00| 0:0:00| chol  1✔
1
 9|1.000|1.000|1.8e-12|3.0e-08|4.3e+01| 3.549229e+01 -7.540751e+00| 0:0:00| chol  1✔
1
10|1.000|1.000|2.0e-12|3.0e-09|1.7e+01| 9.775076e+00 -6.973588e+00| 0:0:00| chol  1✔
1
11|1.000|1.000|5.0e-11|3.0e-10|6.3e+00|-5.881971e-01 -6.872865e+00| 0:0:00| chol  1✔
1
12|1.000|1.000|1.2e-11|3.1e-11|2.6e+00|-4.138016e+00 -6.761485e+00| 0:0:00| chol  1✔
1
13|0.945|0.943|5.5e-12|6.9e-12|5.2e-01|-6.214595e+00 -6.737137e+00| 0:0:00| chol  2✔
```

```
1
14|1.000|1.000|1.7e-11|1.4e-12|1.8e-01|-6.552510e+00 -6.732218e+00| 0:0:00| chol  2↙
2
15|0.964|0.979|1.2e-12|1.7e-12|8.8e-03|-6.722021e+00 -6.730799e+00| 0:0:00| chol  2↙
2
16|0.975|0.980|2.8e-12|1.0e-12|2.2e-04|-6.730526e+00 -6.730747e+00| 0:0:00| chol  6↙
5
17|0.985|1.000|1.0e-11|1.0e-12|1.5e-05|-6.730731e+00 -6.730746e+00| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30  30
18|1.000|1.000|2.0e-10|1.5e-12|1.1e-06|-6.730745e+00 -6.730746e+00| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-------------------------------------------------------------------
 number of iterations   = 18
 primal objective value = -6.73074467e+00
 dual   objective value = -6.73074573e+00
 gap := trace(XZ)        = 1.10e-06
 relative gap           = 7.59e-08
 actual relative gap    = 7.34e-08
 rel. primal infeas     = 1.99e-10
 rel. dual   infeas     = 1.50e-12
 norm(X), norm(y), norm(Z) = 3.2e+01, 9.6e+01, 6.6e+01
 norm(A), norm(b), norm(C) = 5.8e+03, 5.0e+03, 7.7e+01
 Total CPU time (secs)  = 0.32
 CPU time per iteration = 0.02
 termination code       =  0
 DIMACS errors: 3.8e-10  0.0e+00  2.1e-12  0.0e+00  7.3e-08  7.6e-08
-------------------------------------------------------------------


ans =

    6.7307


Iteration   2   Total error is: 0.010558

 num. of constraints = 117
 dim. of socp  var = 118,   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|4.9e+02|1.3e+08| 4.524390e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.988|1.0e-07|5.8e+00|1.5e+06| 4.735635e+04 -5.208639e+02| 0:0:00| chol  1↙
1
 2|1.000|0.960|1.3e-07|2.6e-01|1.1e+05| 4.398933e+04 -1.234215e+01| 0:0:00| chol  1↙
1
 3|0.887|1.000|2.2e-08|1.0e-02|2.8e+04| 2.649827e+04 -2.864889e+01| 0:0:00| chol  1↙
1
 4|1.000|1.000|1.4e-09|3.0e-03|3.1e+03| 3.055857e+03 -1.564846e+01| 0:0:00| chol  1↙
```

```
1
 5|0.953|0.980|3.3e-10|3.5e-04|1.4e+02| 1.316153e+02 -1.289129e+01| 0:0:00| chol  1↙
1
 6|0.274|0.629|4.9e-10|1.5e-04|1.3e+02| 1.225095e+02 -9.681200e+00| 0:0:00| chol  1↙
1
 7|0.472|1.000|2.5e-10|3.0e-06|1.2e+02| 1.069344e+02 -1.088528e+01| 0:0:00| chol  1↙
1
 8|1.000|0.839|5.0e-11|7.3e-07|8.8e+01| 8.030445e+01 -7.490592e+00| 0:0:00| chol  1↙
1
 9|0.873|1.000|8.1e-12|3.0e-08|2.8e+01| 2.178633e+01 -6.465605e+00| 0:0:00| chol  1↙
1
10|1.000|0.942|2.7e-13|4.6e-09|1.2e+01| 7.350069e+00 -5.096428e+00| 0:0:00| chol  1↙
1
11|0.912|1.000|9.6e-12|3.0e-10|4.2e+00|-7.884315e-01 -4.973707e+00| 0:0:00| chol  2↙
2
12|1.000|1.000|1.8e-13|3.1e-11|2.0e+00|-2.797984e+00 -4.841191e+00| 0:0:00| chol  1↙
2
13|0.944|0.892|5.7e-13|7.1e-12|2.1e-01|-4.601273e+00 -4.810671e+00| 0:0:00| chol  2↙
2
14|0.999|0.887|1.7e-12|2.1e-12|9.6e-03|-4.796751e+00 -4.806316e+00| 0:0:00| chol  2↙
2
15|0.974|0.981|1.8e-12|1.1e-12|2.6e-04|-4.805568e+00 -4.805825e+00| 0:0:00| chol  2↙
2
16|0.988|0.989|8.5e-11|1.0e-12|7.9e-06|-4.805807e+00 -4.805815e+00| 0:0:00| chol  9↙
9
17|0.988|0.989|1.2e-11|1.5e-12|2.8e-07|-4.805815e+00 -4.805815e+00| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-------------------------------------------------------------------
 number of iterations   = 17
 primal objective value = -4.80581492e+00
 dual   objective value = -4.80581520e+00
 gap := trace(XZ)       = 2.80e-07
 relative gap           = 2.64e-08
 actual relative gap    = 2.64e-08
 rel. primal infeas     = 1.22e-11
 rel. dual   infeas     = 1.51e-12
 norm(X), norm(y), norm(Z) = 3.3e+01, 9.8e+01, 6.9e+01
 norm(A), norm(b), norm(C) = 5.8e+03, 4.2e+03, 7.7e+01
 Total CPU time (secs) = 0.21
 CPU time per iteration = 0.01
 termination code       =  0
 DIMACS errors: 3.0e-11  0.0e+00  2.2e-12  0.0e+00  2.6e-08  2.6e-08
-------------------------------------------------------------------


ans =

    4.8058


Iteration   3   Total error is: 0.0088975

 num. of constraints = 117
 dim. of socp   var  = 118,   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|4.9e+02|1.2e+08| 4.288506e+04  0.000000e+00| 0:0:00| chol  1✓
1
 1|1.000|0.988|6.6e-08|5.8e+00|1.5e+06| 4.488784e+04 -5.088349e+02| 0:0:00| chol  1✓
1
 2|1.000|0.959|1.0e-07|2.7e-01|1.0e+05| 4.170437e+04 -1.278948e+01| 0:0:00| chol  1✓
1
 3|0.881|1.000|1.8e-08|1.0e-02|2.8e+04| 2.611609e+04 -3.048482e+01| 0:0:00| chol  1✓
1
 4|1.000|1.000|1.3e-09|3.0e-03|2.9e+03| 2.839888e+03 -1.697481e+01| 0:0:00| chol  1✓
1
 5|0.946|0.972|3.3e-10|3.8e-04|1.5e+02| 1.405222e+02 -1.391489e+01| 0:0:00| chol  1✓
1
 6|0.206|0.610|4.3e-10|1.6e-04|1.4e+02| 1.339030e+02 -1.017563e+01| 0:0:00| chol  1✓
1
 7|0.456|0.834|2.3e-10|3.0e-05|1.3e+02| 1.189089e+02 -1.128578e+01| 0:0:00| chol  1✓
1
 8|1.000|0.784|5.6e-11|6.7e-06|9.7e+01| 8.970915e+01 -7.339391e+00| 0:0:00| chol  1✓
1
 9|0.846|1.000|8.3e-12|3.0e-08|2.9e+01| 2.415501e+01 -5.085493e+00| 0:0:00| chol  1✓
1
10|1.000|0.902|8.8e-14|5.6e-09|1.5e+01| 1.125858e+01 -3.345626e+00| 0:0:00| chol  1✓
1
11|0.871|1.000|9.2e-13|3.0e-10|5.1e+00| 1.967946e+00 -3.176061e+00| 0:0:00| chol  1✓
1
12|1.000|1.000|1.5e-12|3.1e-11|2.6e+00|-3.495675e-01 -2.906680e+00| 0:0:00| chol  1✓
2
13|0.916|0.914|1.8e-13|6.4e-12|4.4e-01|-2.425833e+00 -2.866850e+00| 0:0:00| chol  2✓
2
14|0.831|1.000|1.5e-12|1.3e-12|2.0e-01|-2.651727e+00 -2.855538e+00| 0:0:00| chol  2✓
2
15|0.931|0.974|2.7e-12|1.1e-12|2.0e-02|-2.833643e+00 -2.853436e+00| 0:0:00| chol  3✓
3
16|0.959|0.838|1.8e-11|1.2e-12|2.0e-03|-2.851308e+00 -2.853296e+00| 0:0:00| chol  3✓
3
17|0.990|0.976|1.7e-12|1.5e-12|5.7e-05|-2.853210e+00 -2.853267e+00| 0:0:00| chol  4✓
4
18|0.994|0.988|7.5e-11|1.0e-12|3.7e-06|-2.853262e+00 -2.853266e+00| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30   1
19|1.000|0.963|3.3e-11|1.5e-12|5.0e-07|-2.853265e+00 -2.853266e+00| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
--------------------------------------------------------------------
 number of iterations   = 19
 primal objective value = -2.85326538e+00
 dual   objective value = -2.85326587e+00
 gap := trace(XZ)       = 4.98e-07
 relative gap           = 7.43e-08
 actual relative gap    = 7.24e-08
```

```
 rel. primal infeas    = 3.30e-11
 rel. dual   infeas    = 1.54e-12
 norm(X), norm(y), norm(Z) = 3.4e+01, 9.9e+01, 7.0e+01
 norm(A), norm(b), norm(C) = 5.8e+03, 4.7e+03, 7.7e+01
 Total CPU time (secs) = 0.27
 CPU time per iteration = 0.01
 termination code      =  0
 DIMACS errors: 6.2e-11  0.0e+00  2.2e-12  0.0e+00  7.2e-08  7.4e-08
-------------------------------------------------------------------


ans =

    2.8533


Iteration   4   Total error is: 0.0068318

 num. of constraints = 117
 dim. of socp  var  = 118,   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|4.9e+02|1.2e+08| 4.204054e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.988|5.5e-08|5.8e+00|1.4e+06| 4.402175e+04 -4.810525e+02| 0:0:00| chol  1↙
1
 2|1.000|0.954|9.3e-08|3.0e-01|1.1e+05| 4.089269e+04 -1.281172e+01| 0:0:00| chol  1↙
1
 3|0.822|1.000|2.2e-08|1.0e-02|3.1e+04| 2.921345e+04 -3.697277e+01| 0:0:00| chol  1↙
1
 4|1.000|1.000|9.4e-10|3.0e-03|3.6e+03| 3.570146e+03 -1.995587e+01| 0:0:00| chol  1↙
1
 5|0.954|0.970|3.1e-10|3.8e-04|1.7e+02| 1.509708e+02 -1.621341e+01| 0:0:00| chol  1↙
1
 6|0.171|0.691|3.8e-10|1.4e-04|1.6e+02| 1.451959e+02 -1.157193e+01| 0:0:00| chol  1↙
1
 7|0.492|0.796|1.8e-10|3.0e-05|1.4e+02| 1.287850e+02 -1.200938e+01| 0:0:00| chol  1↙
1
 8|1.000|0.769|5.0e-11|7.3e-06|1.0e+02| 9.540185e+01 -7.684728e+00| 0:0:00| chol  1↙
1
 9|0.818|1.000|9.8e-12|3.0e-08|2.7e+01| 2.357249e+01 -3.484692e+00| 0:0:00| chol  1↙
1
10|1.000|0.806|1.4e-12|8.2e-09|1.6e+01| 1.393428e+01 -1.926610e+00| 0:0:00| chol  1↙
1
11|0.850|1.000|3.2e-13|3.0e-10|6.1e+00| 4.249341e+00 -1.830554e+00| 0:0:00| chol  1↙
1
12|1.000|0.939|9.7e-12|4.8e-11|3.2e+00| 1.795821e+00 -1.401315e+00| 0:0:00| chol  1↙
1
13|0.892|0.962|2.5e-13|6.2e-12|6.4e-01|-7.202568e-01 -1.357841e+00| 0:0:00| chol  2↙
2
```

```
14|0.948|0.979|1.6e-12|1.4e-12|2.9e-01|-1.044019e+00 -1.335761e+00| 0:0:00| chol  2↙
2
15|0.925|0.973|1.7e-12|1.1e-12|3.0e-02|-1.302318e+00 -1.332435e+00| 0:0:00| chol  2↙
2
16|0.931|0.975|5.1e-12|1.0e-12|5.6e-03|-1.326538e+00 -1.332094e+00| 0:0:00| chol  3↙
3
17|0.997|0.975|8.0e-12|1.0e-12|1.4e-04|-1.331918e+00 -1.332061e+00| 0:0:00| chol  5↙
5
18|0.994|0.992|2.4e-11|1.5e-12|2.7e-06|-1.332056e+00 -1.332059e+00| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30 ^26
19|0.990|0.809|3.7e-10|2.6e-12|7.7e-08|-1.332059e+00 -1.332059e+00| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-------------------------------------------------------------------
 number of iterations   = 19
 primal objective value = -1.33205902e+00
 dual   objective value = -1.33205902e+00
 gap := trace(XZ)       = 7.74e-08
 relative gap           = 2.11e-08
 actual relative gap    = -1.51e-09
 rel. primal infeas     = 3.72e-10
 rel. dual   infeas     = 2.59e-12
 norm(X), norm(y), norm(Z) = 3.5e+01, 1.0e+02, 7.2e+01
 norm(A), norm(b), norm(C) = 5.9e+03, 5.2e+03, 7.7e+01
 Total CPU time (secs)  = 0.33
 CPU time per iteration = 0.02
 termination code       =  0
 DIMACS errors: 6.8e-10  0.0e+00  3.7e-12  0.0e+00  -1.5e-09  2.1e-08
-------------------------------------------------------------------

ans =

    1.3321

Iteration   5   Total error is: 0.0046228

 num. of constraints = 117
 dim. of socp   var  = 118,   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|4.9e+02|1.2e+08| 4.179031e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.988|4.9e-08|5.9e+00|1.4e+06| 4.377713e+04 -5.164909e+02| 0:0:00| chol  1↙
1
 2|1.000|0.953|8.4e-08|3.1e-01|1.1e+05| 4.069984e+04 -1.320150e+01| 0:0:00| chol  1↙
1
 3|0.795|1.000|2.3e-08|1.0e-02|3.3e+04| 3.093939e+04 -4.149235e+01| 0:0:00| chol  1↙
1
```

```
  4|1.000|1.000|1.0e-09|3.0e-03|3.4e+03| 3.281345e+03 -2.175427e+01| 0:0:00| chol  1↙
1
  5|0.946|0.952|3.0e-10|4.3e-04|1.8e+02| 1.648947e+02 -1.762477e+01| 0:0:00| chol  1↙
1
  6|0.138|0.674|3.5e-10|1.6e-04|1.7e+02| 1.599279e+02 -1.386112e+01| 0:0:00| chol  1↙
1
  7|0.514|0.638|1.8e-10|6.0e-05|1.6e+02| 1.434592e+02 -1.221256e+01| 0:0:00| chol  1↙
1
  8|1.000|1.000|3.9e-11|3.0e-07|1.1e+02| 9.849905e+01 -9.020251e+00| 0:0:00| chol  1↙
1
  9|0.884|1.000|4.8e-12|3.0e-08|3.4e+01| 3.079383e+01 -2.810064e+00| 0:0:00| chol  1↙
1
 10|1.000|1.000|7.0e-13|3.0e-09|1.7e+01| 1.567030e+01 -1.088902e+00| 0:0:00| chol  1↙
1
 11|0.952|1.000|1.1e-11|3.0e-10|6.1e+00| 5.166890e+00 -9.633239e-01| 0:0:00| chol  1↙
2
 12|1.000|1.000|1.3e-13|3.1e-11|3.1e+00| 2.469612e+00 -5.978969e-01| 0:0:00| chol  1↙
2
 13|0.935|0.979|2.2e-13|4.6e-12|5.3e-01| 2.206360e-02 -5.048380e-01| 0:0:00| chol  1↙
2
 14|0.963|1.000|2.7e-12|1.3e-12|1.9e-01|-3.036497e-01 -4.953767e-01| 0:0:00| chol  2↙
2
 15|0.955|0.969|1.9e-12|1.1e-12|1.8e-02|-4.743952e-01 -4.921910e-01| 0:0:00| chol  3↙
3
 16|0.942|0.951|2.0e-11|1.1e-12|1.4e-03|-4.905542e-01 -4.919948e-01| 0:0:00| chol  5↙
5
 17|0.913|0.901|3.6e-10|1.6e-12|2.2e-04|-4.917651e-01 -4.919830e-01| 0:0:00| chol
   linsysolve: Schur complement matrix not positive definite
   switch to LU factor. lu 26  30
 18|1.000|1.000|2.1e-09|2.3e-12|5.9e-05|-4.919207e-01 -4.919812e-01| 0:0:00| lu 30↙
30
 19|1.000|0.861|6.3e-09|3.7e-12|6.6e-06|-4.919704e-01 -4.919808e-01| 0:0:00| lu 30↙
^21
 20|0.352|0.385|4.0e-08|7.3e-12|5.5e-06|-4.919710e-01 -4.919808e-01| 0:0:00| lu 29↙
^13
 21|0.131|0.101|4.9e-08|1.4e-11|5.2e-06|-4.919712e-01 -4.919808e-01| 0:0:00|
   stop: progress is too slow
-------------------------------------------------------------------
 number of iterations   = 21
 primal objective value = -4.91971203e-01
 dual   objective value = -4.91980822e-01
 gap := trace(XZ)        = 5.25e-06
 relative gap            = 2.65e-06
 actual relative gap     = 4.85e-06
 rel. primal infeas      = 4.91e-08
 rel. dual   infeas      = 1.42e-11
 norm(X), norm(y), norm(Z) = 3.6e+01, 1.0e+02, 7.4e+01
 norm(A), norm(b), norm(C) = 6.2e+03, 5.8e+03, 7.7e+01
 Total CPU time (secs)  = 0.46
 CPU time per iteration = 0.02
 termination code       = -5
 DIMACS errors: 8.9e-08  0.0e+00  2.0e-11  0.0e+00  4.8e-06  2.6e-06
-------------------------------------------------------------------
```

```
ans =

    0.4920


Iteration   6   Total error is: 0.0027246

 num. of constraints = 117
 dim. of socp   var = 118,   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|4.9e+02|1.2e+08| 4.223788e+04  0.000000e+00| 0:0:00| chol  1✓
1
 1|1.000|0.988|4.7e-08|5.9e+00|1.5e+06| 4.424802e+04 -5.321024e+02| 0:0:00| chol  1✓
1
 2|1.000|0.952|8.1e-08|3.1e-01|1.1e+05| 4.115633e+04 -1.334477e+01| 0:0:00| chol  1✓
1
 3|0.785|1.000|2.3e-08|1.0e-02|3.4e+04| 3.188357e+04 -4.334169e+01| 0:0:00| chol  1✓
1
 4|1.000|1.000|9.7e-10|3.0e-03|3.3e+03| 3.253629e+03 -2.243543e+01| 0:0:00| chol  1✓
1
 5|0.946|0.948|3.0e-10|4.4e-04|1.8e+02| 1.620394e+02 -1.820178e+01| 0:0:00| chol  1✓
1
 6|0.132|0.607|3.7e-10|1.9e-04|1.7e+02| 1.575490e+02 -1.478587e+01| 0:0:00| chol  1✓
1
 7|0.504|0.556|1.9e-10|8.6e-05|1.5e+02| 1.424113e+02 -1.246920e+01| 0:0:00| chol  1✓
1
 8|1.000|1.000|3.8e-11|3.0e-07|1.1e+02| 9.580390e+01 -9.973306e+00| 0:0:00| chol  1✓
1
 9|1.000|1.000|1.9e-12|3.0e-08|3.8e+01| 3.475833e+01 -2.922073e+00| 0:0:00| chol  1✓
1
10|1.000|1.000|9.4e-13|3.0e-09|1.6e+01| 1.497314e+01 -9.247012e-01| 0:0:00| chol  1✓
1
11|1.000|1.000|3.9e-11|3.0e-10|6.4e+00| 5.604429e+00 -7.511830e-01| 0:0:00| chol  1✓
2
12|1.000|1.000|1.6e-13|3.1e-11|2.7e+00| 2.338374e+00 -3.530334e-01| 0:0:00| chol  1✓
2
13|0.929|1.000|7.9e-13|4.0e-12|5.3e-01| 2.434232e-01 -2.823138e-01| 0:0:00| chol  2✓
2
14|1.000|1.000|1.8e-12|1.3e-12|2.0e-01|-7.285050e-02 -2.694951e-01| 0:0:00| chol  2✓
2
15|0.944|0.969|2.8e-12|1.1e-12|1.9e-02|-2.473775e-01 -2.663480e-01| 0:0:00| chol  3✓
3
16|0.908|0.947|2.2e-11|1.1e-12|2.7e-03|-2.634566e-01 -2.661755e-01| 0:0:00| chol  4✓
5
17|0.961|0.960|4.0e-10|1.5e-12|5.7e-04|-2.655920e-01 -2.661649e-01| 0:0:00| chol 10✓
9
18|1.000|1.000|2.5e-10|2.3e-12|1.6e-04|-2.660062e-01 -2.661637e-01| 0:0:00| chol 22✓
16
```

```
19|1.000|1.000|1.2e-10|3.4e-12|6.9e-06|-2.661562e-01 -2.661632e-01| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30    1
20|0.998|0.932|1.3e-10|5.3e-12|8.7e-08|-2.661631e-01 -2.661632e-01| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-------------------------------------------------------------------
 number of iterations   = 20
 primal objective value = -2.66163088e-01
 dual   objective value = -2.66163168e-01
 gap := trace(XZ)       = 8.73e-08
 relative gap           = 5.70e-08
 actual relative gap    = 5.23e-08
 rel. primal infeas     = 1.28e-10
 rel. dual   infeas     = 5.29e-12
 norm(X), norm(y), norm(Z) = 3.6e+01, 1.0e+02, 7.5e+01
 norm(A), norm(b), norm(C) = 6.3e+03, 6.1e+03, 7.7e+01
 Total CPU time (secs) = 0.31
 CPU time per iteration = 0.02
 termination code        = 0
 DIMACS errors: 2.3e-10  0.0e+00  7.6e-12  0.0e+00  5.2e-08  5.7e-08
-------------------------------------------------------------------


ans =

    0.2662


Iteration   7   Total error is: 0.0019114

 num. of constraints = 117
 dim. of socp  var  = 118,   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|4.9e+02|1.2e+08| 4.291140e+04  0.000000e+00| 0:0:00| chol 1↙
1
 1|1.000|0.988|4.6e-08|5.9e+00|1.5e+06| 4.495397e+04 -5.524350e+02| 0:0:00| chol 1↙
1
 2|1.000|0.952|7.8e-08|3.2e-01|1.1e+05| 4.182882e+04 -1.373329e+01| 0:0:00| chol 1↙
1
 3|0.777|1.000|2.3e-08|1.0e-02|3.5e+04| 3.268876e+04 -4.484506e+01| 0:0:00| chol 1↙
1
 4|1.000|1.000|9.2e-10|3.0e-03|3.2e+03| 3.089831e+03 -2.314272e+01| 0:0:00| chol 1↙
1
 5|0.939|0.939|2.9e-10|4.6e-04|1.9e+02| 1.752965e+02 -1.881085e+01| 0:0:00| chol 1↙
1
 6|0.127|0.650|3.8e-10|1.8e-04|1.9e+02| 1.705049e+02 -1.553007e+01| 0:0:00| chol 1↙
1
 7|0.507|0.554|1.9e-10|8.3e-05|1.7e+02| 1.543791e+02 -1.283146e+01| 0:0:00| chol 1↙
1
```

```
  8|1.000|1.000|3.5e-11|3.0e-07|1.1e+02| 1.024198e+02 -1.074051e+01| 0:0:00| chol  1↙
1
  9|1.000|1.000|1.9e-12|3.0e-08|4.2e+01| 3.901756e+01 -3.143569e+00| 0:0:00| chol  1↙
1
 10|1.000|1.000|4.2e-13|3.0e-09|1.7e+01| 1.611190e+01 -1.005400e+00| 0:0:00| chol  1↙
1
 11|1.000|1.000|1.1e-11|3.0e-10|7.2e+00| 6.512667e+00 -7.068345e-01| 0:0:00| chol  1↙
1
 12|1.000|1.000|8.1e-12|3.1e-11|2.7e+00| 2.400666e+00 -2.846841e-01| 0:0:00| chol  2↙
2
 13|0.955|1.000|5.0e-13|4.6e-12|6.0e-01| 3.935633e-01 -2.065871e-01| 0:0:00| chol  2↙
2
 14|1.000|1.000|2.6e-12|1.3e-12|2.4e-01| 5.226623e-02 -1.882239e-01| 0:0:00| chol  2↙
2
 15|0.941|0.952|1.6e-12|1.1e-12|2.6e-02|-1.569398e-01 -1.832452e-01| 0:0:00| chol  2↙
3
 16|0.942|0.945|1.9e-11|1.1e-12|3.1e-03|-1.797688e-01 -1.829156e-01| 0:0:00| chol  3↙
4
 17|0.957|0.942|2.3e-10|1.6e-12|2.9e-04|-1.826035e-01 -1.828933e-01| 0:0:00| chol  9↙
10
 18|1.000|1.000|1.0e-09|2.3e-12|2.8e-05|-1.828634e-01 -1.828914e-01| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30  30
 19|0.805|0.800|4.3e-08|3.8e-12|6.2e-06|-1.828875e-01 -1.828913e-01| 0:0:00| lu 30 ^↙
6
 20|1.000|1.000|3.9e-08|5.1e-12|3.6e-06|-1.828887e-01 -1.828913e-01| 0:0:00| lu 28↙
30
 21|0.780|0.805|1.2e-08|8.6e-12|2.0e-06|-1.828894e-01 -1.828913e-01| 0:0:00| lu 11↙
30
 22|0.054|0.064|1.3e-08|1.9e-11|1.9e-06|-1.828891e-01 -1.828913e-01| 0:0:00| lu 30↙
^23
 23|0.103|0.147|1.1e-08|3.4e-11|1.9e-06|-1.828880e-01 -1.828913e-01| 0:0:01|
  stop: progress is too slow
  stop: progress is bad
-------------------------------------------------------------------
 number of iterations   = 23
 primal objective value = -1.82889398e-01
 dual   objective value = -1.82891298e-01
 gap := trace(XZ)       = 2.02e-06
 relative gap           = 1.48e-06
 actual relative gap    = 1.39e-06
 rel. primal infeas     = 1.24e-08
 rel. dual   infeas     = 8.58e-12
 norm(X), norm(y), norm(Z) = 3.7e+01, 1.0e+02, 7.5e+01
 norm(A), norm(b), norm(C) = 6.3e+03, 6.3e+03, 7.7e+01
 Total CPU time (secs) = 0.56
 CPU time per iteration = 0.02
 termination code       = -5
 DIMACS errors: 2.2e-08  0.0e+00  1.2e-11  0.0e+00  1.4e-06  1.5e-06
-------------------------------------------------------------------


ans =

    0.1829
```

```
Iteration   8   Total error is: 0.0015094

 num. of constraints = 117
 dim. of socp   var = 118,   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|4.9e+02|1.2e+08| 4.325431e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.988|4.6e-08|5.9e+00|1.5e+06| 4.531253e+04 -5.649706e+02| 0:0:00| chol  1↙
1
 2|1.000|0.952|7.7e-08|3.2e-01|1.1e+05| 4.217096e+04 -1.399463e+01| 0:0:00| chol  1↙
1
 3|0.771|1.000|2.3e-08|1.0e-02|3.5e+04| 3.320917e+04 -4.603370e+01| 0:0:00| chol  1↙
1
 4|1.000|1.000|8.9e-10|3.0e-03|3.0e+03| 2.938945e+03 -2.375098e+01| 0:0:00| chol  1↙
1
 5|0.930|0.928|2.8e-10|4.9e-04|2.1e+02| 1.915919e+02 -1.929890e+01| 0:0:00| chol  1↙
1
 6|0.123|0.716|3.6e-10|1.6e-04|2.0e+02| 1.863626e+02 -1.605710e+01| 0:0:00| chol  1↙
1
 7|0.514|0.575|1.9e-10|7.0e-05|1.8e+02| 1.685728e+02 -1.314098e+01| 0:0:00| chol  1↙
1
 8|1.000|1.000|3.4e-11|3.0e-07|1.2e+02| 1.110203e+02 -1.123727e+01| 0:0:00| chol  1↙
1
 9|1.000|1.000|1.7e-12|3.0e-08|4.5e+01| 4.162188e+01 -3.400951e+00| 0:0:00| chol  1↙
1
10|1.000|1.000|5.4e-13|3.0e-09|2.0e+01| 1.852436e+01 -1.057014e+00| 0:0:00| chol  1↙
1
11|1.000|1.000|8.2e-12|3.0e-10|8.0e+00| 7.208366e+00 -8.330414e-01| 0:0:00| chol  1↙
1
12|1.000|1.000|1.3e-11|3.1e-11|3.4e+00| 3.112058e+00 -2.758083e-01| 0:0:00| chol  1↙
2
13|0.935|1.000|6.9e-13|5.2e-12|7.8e-01| 6.012525e-01 -1.789108e-01| 0:0:00| chol  2↙
2
14|1.000|1.000|2.1e-12|1.3e-12|3.2e-01| 1.692212e-01 -1.506784e-01| 0:0:00| chol  2↙
2
15|0.928|0.970|1.5e-12|1.1e-12|4.8e-02|-9.545436e-02 -1.431545e-01| 0:0:00| chol  3↙
3
16|1.000|1.000|2.6e-11|1.0e-12|1.2e-02|-1.307443e-01 -1.425784e-01| 0:0:00| chol  3↙
3
17|1.000|1.000|3.2e-11|1.5e-12|1.8e-03|-1.407365e-01 -1.424936e-01| 0:0:00| chol  4↙
4
18|0.979|0.982|7.7e-11|2.3e-12|3.9e-05|-1.424455e-01 -1.424847e-01| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30    2
19|0.990|0.989|1.4e-10|3.4e-12|9.4e-07|-1.424834e-01 -1.424845e-01| 0:0:00| lu 30↙
30
```

```
20|1.000|0.884|1.0e-09|5.5e-12|2.3e-08|-1.424844e-01 -1.424845e-01| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-------------------------------------------------------------------
 number of iterations  = 20
 primal objective value = -1.42484441e-01
 dual   objective value = -1.42484544e-01
 gap := trace(XZ)      = 2.35e-08
 relative gap          = 1.83e-08
 actual relative gap   = 8.04e-08
 rel. primal infeas    = 1.01e-09
 rel. dual   infeas    = 5.46e-12
 norm(X), norm(y), norm(Z) = 3.7e+01, 1.0e+02, 7.5e+01
 norm(A), norm(b), norm(C) = 6.3e+03, 6.5e+03, 7.7e+01
 Total CPU time (secs) = 0.39
 CPU time per iteration = 0.02
 termination code      = 0
 DIMACS errors: 1.8e-09  0.0e+00  7.8e-12  0.0e+00  8.0e-08  1.8e-08
-------------------------------------------------------------------


ans =

    0.1425


Iteration  9   Total error is: 0.0012715

 num. of constraints = 117
 dim. of socp  var  = 118,   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|4.9e+02|1.2e+08| 4.330655e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.988|4.5e-08|6.0e+00|1.5e+06| 4.536663e+04 -5.752500e+02| 0:0:00| chol  1↙
1
 2|1.000|0.951|7.6e-08|3.2e-01|1.2e+05| 4.222958e+04 -1.414961e+01| 0:0:00| chol  1↙
1
 3|0.767|1.000|2.3e-08|1.0e-02|3.5e+04| 3.342356e+04 -4.676909e+01| 0:0:00| chol  1↙
1
 4|1.000|1.000|8.6e-10|3.0e-03|2.8e+03| 2.766184e+03 -2.416579e+01| 0:0:00| chol  1↙
1
 5|0.919|0.915|2.8e-10|5.3e-04|2.3e+02| 2.108420e+02 -1.958446e+01| 0:0:00| chol  1↙
1
 6|0.121|0.797|3.7e-10|1.3e-04|2.2e+02| 2.050644e+02 -1.627472e+01| 0:0:00| chol  1↙
1
 7|0.522|0.618|1.7e-10|5.2e-05|2.0e+02| 1.850144e+02 -1.339314e+01| 0:0:00| chol  1↙
1
 8|1.000|1.000|3.3e-11|3.0e-07|1.3e+02| 1.219141e+02 -1.146689e+01| 0:0:00| chol  1↙
1
 9|0.964|1.000|2.3e-12|3.0e-08|4.8e+01| 4.469717e+01 -3.605523e+00| 0:0:00| chol  1↙
```

```
1
10|1.000|1.000|4.6e-13|3.0e-09|2.3e+01| 2.208366e+01 -1.164348e+00| 0:0:00| chol  1↙
1
11|1.000|1.000|9.2e-13|3.0e-10|9.1e+00| 8.176024e+00 -9.629235e-01| 0:0:00| chol  1↙
1
12|1.000|1.000|2.3e-13|3.1e-11|4.2e+00| 3.861788e+00 -3.029253e-01| 0:0:00| chol  1↙
2
13|0.943|1.000|6.9e-14|4.0e-12|9.4e-01| 7.709345e-01 -1.669005e-01| 0:0:00| chol  2↙
2
14|1.000|1.000|9.2e-13|1.3e-12|3.9e-01| 2.524263e-01 -1.338635e-01| 0:0:00| chol  2↙
2
15|0.930|0.981|1.5e-12|1.1e-12|6.3e-02|-6.078238e-02 -1.234025e-01| 0:0:00| chol  2↙
3
16|1.000|1.000|1.2e-11|1.0e-12|2.1e-02|-1.015881e-01 -1.226317e-01| 0:0:00| chol  3↙
3
17|1.000|1.000|3.8e-11|1.5e-12|5.5e-03|-1.169345e-01 -1.224053e-01| 0:0:00| chol  3↙
3
18|0.956|0.976|1.6e-11|2.3e-12|3.7e-04|-1.219980e-01 -1.223663e-01| 0:0:00| chol  5↙
5
19|0.984|1.000|1.1e-10|3.2e-12|3.2e-05|-1.223330e-01 -1.223650e-01| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30  30
20|1.000|0.874|6.0e-10|5.2e-12|2.4e-06|-1.223618e-01 -1.223649e-01| 0:0:00| lu 30↙
30
21|0.245|0.244|2.0e-08|1.1e-11|1.9e-06|-1.223635e-01 -1.223649e-01| 0:0:00| lu 30↙
30
22|0.909|0.576|3.1e-08|1.6e-11|1.4e-06|-1.223621e-01 -1.223649e-01| 0:0:01|
  stop: progress is too slow
-----------------------------------------------------------------
 number of iterations  = 22
 primal objective value = -1.22362118e-01
 dual   objective value = -1.22364873e-01
 gap := trace(XZ)       = 1.41e-06
 relative gap           = 1.13e-06
 actual relative gap    = 2.21e-06
 rel. primal infeas     = 3.13e-08
 rel. dual   infeas     = 1.56e-11
 norm(X), norm(y), norm(Z) = 3.7e+01, 1.0e+02, 7.5e+01
 norm(A), norm(b), norm(C) = 6.3e+03, 6.6e+03, 7.7e+01
 Total CPU time (secs)  = 0.53
 CPU time per iteration = 0.02
 termination code       = -5
 DIMACS errors: 5.7e-08  0.0e+00  2.2e-11  0.0e+00  2.2e-06  1.1e-06
-----------------------------------------------------------------


ans =

    0.1224


Iteration   10   Total error is: 0.0011382
The total representation error of the testing signals is: 0.011573
>>
```