```
>> 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|2.6e+07| 2.782680e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.989|2.0e-07|1.7e+00|3.3e+05| 2.935133e+04 -1.108058e+02| 0:0:00| chol  1↙
1
 2|1.000|0.975|2.1e-07|7.7e-02|3.3e+04| 2.160118e+04 -2.445518e+01| 0:0:00| chol  1↙
1
 3|0.982|1.000|9.7e-08|1.1e-02|2.3e+03| 1.873801e+03 -2.586122e+01| 0:0:00| chol  1↙
1
 4|1.000|1.000|1.8e-08|3.3e-03|2.6e+02| 2.087346e+02 -2.606064e+01| 0:0:00| chol  1↙
1
 5|0.688|0.700|1.0e-08|1.2e-03|9.9e+01| 6.994820e+01 -2.524278e+01| 0:0:00| chol  1↙
1
 6|0.843|0.961|3.1e-09|7.8e-05|7.6e+01| 5.093945e+01 -2.454986e+01| 0:0:00| chol  1↙
1
 7|0.566|1.000|1.4e-09|3.3e-06|6.2e+01| 3.698536e+01 -2.463725e+01| 0:0:00| chol  1↙
2
 8|1.000|1.000|6.1e-11|3.3e-07|3.7e+01| 1.270451e+01 -2.426333e+01| 0:0:00| chol  1↙
1
 9|1.000|1.000|1.4e-11|3.3e-08|1.5e+01|-9.232193e+00 -2.396835e+01| 0:0:00| chol  1↙
1
10|1.000|1.000|1.3e-12|3.3e-09|6.8e+00|-1.694340e+01 -2.376875e+01| 0:0:00| chol  1↙
1
11|1.000|1.000|1.6e-12|3.3e-10|2.1e+00|-2.147417e+01 -2.360632e+01| 0:0:00| chol  1↙
1
12|1.000|1.000|4.8e-14|3.4e-11|7.6e-01|-2.272959e+01 -2.349127e+01| 0:0:00| chol  1↙
1
13|0.969|1.000|2.3e-12|4.3e-12|1.1e-01|-2.333290e+01 -2.344336e+01| 0:0:00| chol  2↙
2
14|1.000|1.000|2.9e-13|1.3e-12|1.7e-02|-2.341920e+01 -2.343666e+01| 0:0:00| chol  2↙
2
15|0.971|0.966|2.9e-12|1.1e-12|8.2e-04|-2.343419e+01 -2.343501e+01| 0:0:00| chol  2↙
2
16|0.957|0.944|4.6e-11|1.1e-12|1.4e-04|-2.343479e+01 -2.343493e+01| 0:0:00| chol  4↙
4
17|1.000|1.000|1.0e-10|1.5e-12|3.2e-05|-2.343489e+01 -2.343492e+01| 0:0:00| chol  3↙
3
18|1.000|1.000|4.1e-11|2.2e-12|1.0e-06|-2.343491e+01 -2.343491e+01| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-------------------------------------------------------------------
 number of iterations   = 18
```

```
 primal objective value = -2.34349128e+01
 dual   objective value = -2.34349138e+01
 gap := trace(XZ)       = 1.01e-06
 relative gap           = 2.12e-08
 actual relative gap    = 2.14e-08
 rel. primal infeas     = 4.10e-11
 rel. dual   infeas     = 2.25e-12
 norm(X), norm(y), norm(Z) = 9.2e+00, 6.4e+01, 2.4e+01
 norm(A), norm(b), norm(C) = 1.4e+03, 9.6e+02, 7.9e+01
 Total CPU time (secs)  = 0.28
 CPU time per iteration = 0.02
 termination code       =  0
 DIMACS errors: 1.0e-10  0.0e+00  3.3e-12  0.0e+00  2.1e-08  2.1e-08
------------------------------------------------------------------

ans =

   23.4349


 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|4.7e+07| 5.241860e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.989|2.3e-07|1.7e+00|6.1e+05| 5.399374e+04 -1.724367e+02| 0:0:00| chol  1↙
1
 2|1.000|0.923|2.2e-07|1.6e-01|8.5e+04| 4.064748e+04 -1.366319e+01| 0:0:00| chol  1↙
1
 3|1.000|1.000|5.1e-08|1.1e-02|1.5e+04| 1.297670e+04 -2.666144e+01| 0:0:00| chol  1↙
1
 4|1.000|1.000|4.8e-09|3.3e-03|9.2e+02| 8.152800e+02 -1.932909e+01| 0:0:00| chol  1↙
1
 5|0.630|0.610|2.0e-08|1.9e-03|5.8e+02| 5.395863e+02 -1.434776e+01| 0:0:00| chol  1↙
1
 6|0.908|1.000|5.9e-09|9.8e-05|4.0e+02| 3.871639e+02 -1.099682e+01| 0:0:00| chol  1↙
1
 7|1.000|1.000|8.5e-10|9.8e-06|2.4e+02| 2.264919e+02 -8.977153e+00| 0:0:00| chol  1↙
1
 8|1.000|1.000|2.0e-10|9.8e-07|1.1e+02| 9.790175e+01 -7.525327e+00| 0:0:00| chol  1↙
1
 9|1.000|1.000|3.1e-11|9.8e-08|5.0e+01| 4.378258e+01 -6.324294e+00| 0:0:00| chol  1↙
1
10|1.000|1.000|1.2e-12|9.8e-09|1.8e+01| 1.236259e+01 -5.852612e+00| 0:0:00| chol  1↙
1
11|1.000|1.000|6.3e-13|9.8e-10|6.5e+00| 9.328334e-01 -5.563998e+00| 0:0:00| chol  1↙
1
```

```
12|0.988|1.000|9.2e-12|9.9e-11|1.2e+00|-4.305295e+00 -5.486327e+00| 0:0:00| chol  1↙
2
13|1.000|1.000|3.1e-13|1.1e-11|4.2e-01|-5.038963e+00 -5.459452e+00| 0:0:00| chol  2↙
2
14|0.904|0.962|1.5e-12|2.4e-12|1.1e-01|-5.337141e+00 -5.450641e+00| 0:0:00| chol  2↙
2
15|0.793|1.000|6.1e-12|1.1e-12|5.1e-02|-5.399316e+00 -5.450484e+00| 0:0:00| chol  2↙
2
16|1.000|0.973|3.0e-11|1.3e-12|7.6e-03|-5.442015e+00 -5.449600e+00| 0:0:00| chol  3↙
3
17|0.880|0.952|3.4e-11|1.9e-12|2.7e-03|-5.446843e+00 -5.449543e+00| 0:0:00| chol  3↙
3
18|0.977|0.976|5.5e-11|2.8e-12|6.8e-05|-5.449449e+00 -5.449516e+00| 0:0:00| chol  5↙
5
19|0.993|0.994|1.8e-10|4.1e-12|2.6e-06|-5.449513e+00 -5.449516e+00| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30 ^17
20|0.771|0.746|2.7e-09|7.2e-12|6.7e-07|-5.449516e+00 -5.449516e+00| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-------------------------------------------------------------------
 number of iterations   = 20
 primal objective value = -5.44951565e+00
 dual   objective value = -5.44951576e+00
 gap := trace(XZ)       = 6.74e-07
 relative gap           = 5.67e-08
 actual relative gap    = 8.69e-09
 rel. primal infeas     = 2.75e-09
 rel. dual   infeas     = 7.24e-12
 norm(X), norm(y), norm(Z) = 3.3e+01, 9.8e+01, 6.9e+01
 norm(A), norm(b), norm(C) = 1.9e+03, 1.9e+03, 7.9e+01
 Total CPU time (secs)  = 0.31
 CPU time per iteration = 0.02
 termination code       =  0
 DIMACS errors: 7.6e-09  0.0e+00  1.1e-11  0.0e+00  8.7e-09  5.7e-08
-------------------------------------------------------------------

ans =

    5.4495

Iteration   2   Total error is: 0.0095157

 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| 6.492817e+04  0.000000e+00| 0:0:00| chol  1↙
1
```

```
 1|1.000|0.990|2.8e-07|1.7e+00|7.4e+05| 6.625795e+04 -2.496853e+02| 0:0:00| chol  1↙
1
 2|1.000|0.927|2.4e-07|2.2e-01|1.1e+05| 4.613498e+04 -1.375533e+01| 0:0:00| chol  1↙
1
 3|0.823|1.000|9.0e-08|3.0e-02|3.3e+04| 2.611911e+04 -3.979863e+01| 0:0:00| chol  1↙
1
 4|1.000|1.000|4.6e-09|9.1e-03|5.5e+03| 4.714721e+03 -2.536711e+01| 0:0:00| chol  1↙
1
 5|0.934|0.945|2.1e-08|3.1e-03|4.2e+02| 3.627570e+02 -1.961555e+01| 0:0:00| chol  1↙
1
 6|0.153|1.000|1.8e-08|2.7e-04|3.7e+02| 3.528389e+02 -1.646731e+01| 0:0:00| chol  1↙
1
 7|0.909|0.734|4.9e-09|9.2e-05|2.8e+02| 2.716575e+02 -9.337004e+00| 0:0:00| chol  1↙
1
 8|1.000|1.000|2.9e-10|2.7e-06|1.5e+02| 1.385633e+02 -7.248199e+00| 0:0:00| chol  1↙
1
 9|1.000|1.000|4.8e-11|2.7e-07|6.2e+01| 5.652745e+01 -5.949973e+00| 0:0:00| chol  1↙
1
10|1.000|1.000|1.4e-12|2.7e-08|2.5e+01| 2.002471e+01 -5.153072e+00| 0:0:00| chol  1↙
1
11|1.000|1.000|6.2e-13|2.7e-09|7.3e+00| 2.501798e+00 -4.802574e+00| 0:0:00| chol  1↙
1
12|1.000|1.000|6.9e-13|2.7e-10|2.2e+00|-2.466081e+00 -4.702957e+00| 0:0:00| chol  1↙
1
13|0.959|0.989|2.3e-12|3.1e-11|3.7e-01|-4.298486e+00 -4.669755e+00| 0:0:00| chol  2↙
2
14|0.964|0.994|2.4e-12|3.9e-12|1.9e-01|-4.463275e+00 -4.653655e+00| 0:0:00| chol  2↙
2
15|1.000|1.000|3.1e-12|1.3e-12|8.3e-02|-4.570123e+00 -4.652744e+00| 0:0:00| chol  2↙
2
16|0.992|0.880|1.9e-12|1.2e-12|8.8e-03|-4.641722e+00 -4.650571e+00| 0:0:00| chol  2↙
3
17|0.678|0.878|7.5e-12|1.1e-12|4.6e-03|-4.645819e+00 -4.650408e+00| 0:0:00| chol  3↙
3
18|0.909|1.000|5.8e-11|1.5e-12|1.6e-03|-4.648746e+00 -4.650347e+00| 0:0:00| chol  3↙
3
19|1.000|1.000|1.6e-10|2.2e-12|5.2e-04|-4.649816e+00 -4.650333e+00| 0:0:00| chol  3↙
3
20|0.962|0.992|8.0e-11|3.4e-12|5.2e-05|-4.650276e+00 -4.650328e+00| 0:0:00| chol  6↙
6
21|0.997|0.999|6.1e-11|5.1e-12|1.6e-06|-4.650326e+00 -4.650327e+00| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30  30
22|0.995|0.938|4.5e-10|7.9e-12|2.8e-08|-4.650328e+00 -4.650327e+00| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
------------------------------------------------------------------
 number of iterations   = 22
 primal objective value = -4.65032750e+00
 dual   objective value = -4.65032745e+00
 gap := trace(XZ)       = 2.76e-08
 relative gap           = 2.68e-09
 actual relative gap    = -5.17e-09
 rel. primal infeas     = 4.49e-10
 rel. dual   infeas     = 7.89e-12
```

```
 norm(X), norm(y), norm(Z) = 3.4e+01, 1.0e+02, 7.1e+01
 norm(A), norm(b), norm(C) = 2.1e+03, 1.9e+03, 7.9e+01
 Total CPU time (secs)  = 0.28
 CPU time per iteration = 0.01
 termination code       =  0
 DIMACS errors: 1.3e-09  0.0e+00  1.1e-11  0.0e+00  -5.2e-09  2.7e-09
------------------------------------------------------------------

ans =

    4.6503

Iteration   3   Total error is: 0.008789

 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|8.5e+07| 9.683275e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.990|3.3e-07|1.7e+00|1.1e+06| 9.802673e+04 -2.803236e+02| 0:0:00| chol  1↙
1
 2|1.000|0.929|2.5e-07|2.1e-01|1.6e+05| 6.800635e+04 -1.516000e+01| 0:0:00| chol  1↙
1
 3|0.795|1.000|1.1e-07|5.0e-02|5.1e+04| 3.623747e+04 -4.613653e+01| 0:0:00| chol  1↙
1
 4|1.000|1.000|8.0e-09|1.5e-02|9.3e+03| 7.527478e+03 -2.804885e+01| 0:0:00| chol  1↙
1
 5|0.955|0.975|1.7e-08|4.8e-03|5.8e+02| 4.654246e+02 -2.128731e+01| 0:0:00| chol  1↙
1
 6|0.197|1.000|1.5e-08|1.4e-03|4.9e+02| 4.510214e+02 -1.664566e+01| 0:0:00| chol  1↙
1
 7|0.968|0.772|4.9e-09|4.1e-04|3.4e+02| 3.299787e+02 -9.735296e+00| 0:0:00| chol  1↙
1
 8|1.000|1.000|2.6e-10|1.4e-05|1.9e+02| 1.774925e+02 -7.572568e+00| 0:0:00| chol  1↙
1
 9|1.000|1.000|3.2e-11|1.4e-06|7.5e+01| 6.933593e+01 -6.041827e+00| 0:0:00| chol  1↙
1
10|1.000|1.000|5.6e-12|1.4e-07|3.4e+01| 2.938798e+01 -4.957863e+00| 0:0:00| chol  1↙
1
11|1.000|1.000|2.1e-12|1.4e-08|1.0e+01| 5.537499e+00 -4.562711e+00| 0:0:00| chol  1↙
1
12|1.000|1.000|1.0e-12|1.4e-09|4.0e+00|-3.642406e-01 -4.396751e+00| 0:0:00| chol  1↙
1
13|0.951|1.000|3.2e-11|1.4e-10|7.0e-01|-3.642379e+00 -4.341101e+00| 0:0:00| chol  2↙
2
14|0.996|0.986|4.6e-12|1.7e-11|2.9e-01|-4.032122e+00 -4.322694e+00| 0:0:00| chol  2↙
2
```

```
15|1.000|1.000|1.7e-11|2.4e-12|1.6e-01|-4.161092e+00 -4.319241e+00| 0:0:00| chol  2↙
2
16|0.964|1.000|4.2e-12|1.6e-12|3.6e-02|-4.279877e+00 -4.315464e+00| 0:0:00| chol  2↙
2
17|0.810|1.000|1.3e-11|1.0e-12|1.8e-02|-4.297071e+00 -4.315376e+00| 0:0:00| chol  2↙
2
18|1.000|0.933|1.7e-11|1.6e-12|2.7e-03|-4.312332e+00 -4.315008e+00| 0:0:00| chol  3↙
3
19|0.935|0.970|3.8e-11|2.3e-12|5.2e-04|-4.314449e+00 -4.314972e+00| 0:0:00| chol  4↙
3
20|0.968|1.000|1.9e-10|3.4e-12|9.5e-05|-4.314871e+00 -4.314966e+00| 0:0:00| chol  8↙
8
21|1.000|1.000|7.8e-10|5.1e-12|1.2e-05|-4.314953e+00 -4.314965e+00| 0:0:00| chol 22↙
26
22|1.000|1.000|2.6e-10|7.6e-12|2.0e-07|-4.314965e+00 -4.314965e+00| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-----------------------------------------------------------------
 number of iterations   = 22
 primal objective value = -4.31496464e+00
 dual   objective value = -4.31496488e+00
 gap := trace(XZ)       = 1.99e-07
 relative gap           = 2.07e-08
 actual relative gap    = 2.42e-08
 rel. primal infeas     = 2.63e-10
 rel. dual   infeas     = 7.59e-12
 norm(X), norm(y), norm(Z) = 3.5e+01, 1.0e+02, 7.1e+01
 norm(A), norm(b), norm(C) = 2.2e+03, 2.0e+03, 7.9e+01
 Total CPU time (secs)  = 0.28
 CPU time per iteration = 0.01
 termination code       =  0
 DIMACS errors: 7.9e-10  0.0e+00  1.1e-11  0.0e+00  2.4e-08  2.1e-08
-----------------------------------------------------------------

ans =

    4.3150

Iteration   4   Total error is: 0.0084656

 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|1.0e+08| 1.166930e+05  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.990|3.2e-07|1.7e+00|1.3e+06| 1.179651e+05 -2.948944e+02| 0:0:00| chol  1↙
1
 2|1.000|0.931|2.2e-07|2.1e-01|1.9e+05| 8.172464e+04 -1.527732e+01| 0:0:00| chol  1↙
```

```
1
 3|0.777|1.000|9.5e-08|5.0e-02|6.2e+04| 4.400707e+04 -5.097643e+01| 0:0:00| chol  1↙
1
 4|1.000|1.000|8.1e-09|1.5e-02|1.2e+04| 9.945922e+03 -3.003801e+01| 0:0:00| chol  1↙
1
 5|0.962|0.981|1.9e-08|4.7e-03|6.8e+02| 5.454694e+02 -2.196251e+01| 0:0:00| chol  1↙
1
 6|0.237|1.000|1.6e-08|1.4e-03|5.7e+02| 5.232900e+02 -1.570456e+01| 0:0:00| chol  1↙
1
 7|1.000|0.831|4.7e-09|5.7e-04|3.8e+02| 3.663667e+02 -9.605649e+00| 0:0:00| chol  1↙
1
 8|1.000|1.000|2.8e-10|4.1e-05|2.1e+02| 1.979044e+02 -7.788904e+00| 0:0:00| chol  1↙
1
 9|1.000|1.000|6.9e-11|4.1e-06|8.1e+01| 7.540045e+01 -5.916564e+00| 0:0:00| chol  1↙
1
10|1.000|1.000|8.9e-13|4.1e-07|3.9e+01| 3.464263e+01 -4.792671e+00| 0:0:00| chol  1↙
1
11|1.000|1.000|3.3e-12|4.1e-08|1.2e+01| 7.227996e+00 -4.333212e+00| 0:0:00| chol  1↙
1
12|1.000|1.000|4.6e-12|4.1e-09|4.8e+00| 6.258615e-01 -4.133007e+00| 0:0:00| chol  1↙
1
13|0.951|1.000|2.1e-11|4.1e-10|9.1e-01|-3.148565e+00 -4.058467e+00| 0:0:00| chol  2↙
2
14|1.000|1.000|2.2e-12|4.2e-11|3.9e-01|-3.639582e+00 -4.033044e+00| 0:0:00| chol  2↙
2
15|1.000|1.000|8.8e-12|5.1e-12|1.5e-01|-3.874220e+00 -4.024316e+00| 0:0:00| chol  2↙
2
16|1.000|1.000|8.0e-12|1.9e-12|3.9e-02|-3.980858e+00 -4.019437e+00| 0:0:00| chol  2↙
2
17|1.000|1.000|3.9e-12|1.6e-12|9.9e-03|-4.008476e+00 -4.018353e+00| 0:0:00| chol  2↙
2
18|1.000|1.000|2.6e-11|1.0e-12|2.9e-03|-4.015128e+00 -4.018051e+00| 0:0:00| chol  3↙
3
19|0.730|0.891|9.4e-11|1.6e-12|1.3e-03|-4.016696e+00 -4.018001e+00| 0:0:00| chol  4↙
4
20|0.685|1.000|1.5e-10|2.3e-12|9.2e-04|-4.017070e+00 -4.017993e+00| 0:0:00| chol  3↙
3
21|1.000|1.000|4.8e-11|3.4e-12|2.7e-04|-4.017710e+00 -4.017979e+00| 0:0:00| chol  4↙
4
22|1.000|1.000|1.2e-10|5.1e-12|1.0e-04|-4.017872e+00 -4.017974e+00| 0:0:00| chol  4↙
4
23|1.000|0.838|1.2e-10|8.4e-12|1.8e-05|-4.017955e+00 -4.017973e+00| 0:0:00| chol  7↙
6
24|1.000|0.945|7.0e-10|1.2e-11|5.8e-06|-4.017967e+00 -4.017972e+00| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 15 ^26
25|1.000|0.922|7.5e-09|1.8e-11|1.2e-06|-4.017971e+00 -4.017972e+00| 0:0:00| lu 30↙
^14
26|0.623|0.494|6.3e-09|3.5e-11|8.1e-07|-4.017972e+00 -4.017972e+00| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-------------------------------------------------------------------
 number of iterations   = 26
 primal objective value = -4.01797203e+00
 dual   objective value = -4.01797229e+00
```

```
 gap := trace(XZ)       = 8.11e-07
 relative gap           = 8.98e-08
 actual relative gap    = 2.83e-08
 rel. primal infeas     = 6.28e-09
 rel. dual   infeas     = 3.48e-11
 norm(X), norm(y), norm(Z) = 3.5e+01, 1.0e+02, 7.1e+01
 norm(A), norm(b), norm(C) = 2.2e+03, 2.0e+03, 7.9e+01
 Total CPU time (secs)  = 0.34
 CPU time per iteration = 0.01
 termination code       =  0
 DIMACS errors: 2.0e-08  0.0e+00  5.1e-11  0.0e+00  2.8e-08  9.0e-08
------------------------------------------------------------------

ans =

    4.0180

Iteration   5   Total error is: 0.0081711

 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|9.2e+07| 1.039811e+05  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.990|3.1e-07|1.7e+00|1.2e+06| 1.052562e+05 -2.577880e+02| 0:0:00| chol  1↙
1
 2|1.000|0.930|2.2e-07|2.1e-01|1.7e+05| 7.314492e+04 -1.540694e+01| 0:0:00| chol  1↙
1
 3|0.802|1.000|9.9e-08|5.0e-02|5.3e+04| 3.749763e+04 -4.624414e+01| 0:0:00| chol  1↙
1
 4|1.000|1.000|8.9e-09|1.5e-02|1.1e+04| 8.572817e+03 -2.881137e+01| 0:0:00| chol  1↙
1
 5|0.956|0.979|1.8e-08|4.8e-03|6.4e+02| 5.172692e+02 -2.145515e+01| 0:0:00| chol  1↙
1
 6|0.218|1.000|1.6e-08|1.4e-03|5.4e+02| 4.981884e+02 -1.590417e+01| 0:0:00| chol  1↙
1
 7|0.989|0.794|5.1e-09|3.9e-04|3.7e+02| 3.542514e+02 -9.032329e+00| 0:0:00| chol  1↙
1
 8|1.000|1.000|3.5e-10|1.4e-05|2.0e+02| 1.944724e+02 -6.908335e+00| 0:0:00| chol  1↙
1
 9|1.000|1.000|6.3e-11|1.4e-06|8.2e+01| 7.637065e+01 -5.178454e+00| 0:0:00| chol  1↙
1
10|1.000|1.000|1.4e-12|1.4e-07|3.7e+01| 3.328230e+01 -4.034872e+00| 0:0:00| chol  1↙
1
11|1.000|1.000|3.0e-13|1.4e-08|1.1e+01| 7.364938e+00 -3.583019e+00| 0:0:00| chol  1↙
1
12|1.000|1.000|1.3e-12|1.4e-09|4.3e+00| 9.265465e-01 -3.392943e+00| 0:0:00| chol  1↙
```

```
1
13|0.947|1.000|4.0e-12|1.4e-10|8.0e-01|-2.513178e+00 -3.316579e+00| 0:0:00| chol  2↙
2
14|1.000|1.000|5.8e-12|1.5e-11|3.7e-01|-2.906149e+00 -3.280827e+00| 0:0:00| chol  2↙
2
15|1.000|1.000|5.8e-12|2.5e-12|1.8e-01|-3.095734e+00 -3.274646e+00| 0:0:00| chol  2↙
2
16|0.945|0.872|2.0e-12|1.6e-12|3.2e-02|-3.235790e+00 -3.267604e+00| 0:0:00| chol  2↙
2
17|0.891|0.973|1.1e-11|1.1e-12|1.6e-02|-3.250821e+00 -3.267173e+00| 0:0:00| chol  2↙
2
18|1.000|0.984|2.0e-11|1.5e-12|3.5e-03|-3.263082e+00 -3.266548e+00| 0:0:00| chol  3↙
3
19|0.869|0.865|2.4e-11|2.5e-12|1.1e-03|-3.265429e+00 -3.266497e+00| 0:0:00| chol  3↙
4
20|1.000|1.000|9.4e-11|3.4e-12|3.8e-04|-3.266097e+00 -3.266479e+00| 0:0:00| chol  4↙
5
21|1.000|1.000|4.9e-10|5.1e-12|1.2e-04|-3.266356e+00 -3.266476e+00| 0:0:00| chol  5↙
6
22|1.000|1.000|2.0e-10|7.6e-12|2.7e-05|-3.266447e+00 -3.266475e+00| 0:0:00| chol  8↙
8
23|1.000|1.000|3.8e-10|1.1e-11|2.3e-06|-3.266472e+00 -3.266474e+00| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30  30
24|0.997|0.871|7.2e-10|1.9e-11|6.8e-08|-3.266474e+00 -3.266474e+00| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-------------------------------------------------------------------
 number of iterations   = 24
 primal objective value = -3.26647420e+00
 dual   objective value = -3.26647421e+00
 gap := trace(XZ)       = 6.84e-08
 relative gap           = 9.07e-09
 actual relative gap    = 1.58e-09
 rel. primal infeas     = 7.22e-10
 rel. dual   infeas     = 1.86e-11
 norm(X), norm(y), norm(Z) = 3.6e+01, 1.0e+02, 7.4e+01
 norm(A), norm(b), norm(C) = 2.2e+03, 1.9e+03, 7.9e+01
 Total CPU time (secs)  = 0.29
 CPU time per iteration = 0.01
 termination code       =  0
 DIMACS errors: 2.0e-09  0.0e+00  2.7e-11  0.0e+00  1.6e-09  9.1e-09
-------------------------------------------------------------------

ans =

    3.2665

Iteration   6   Total error is: 0.0073657

 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|8.3e+07| 9.427232e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.990|2.3e-07|1.7e+00|1.1e+06| 9.549635e+04 -2.442301e+02| 0:0:00| chol  1↙
1
 2|1.000|0.931|1.6e-07|2.1e-01|1.6e+05| 6.640221e+04 -1.573193e+01| 0:0:00| chol  1↙
1
 3|0.829|1.000|6.6e-08|5.0e-02|4.6e+04| 3.211813e+04 -4.293307e+01| 0:0:00| chol  1↙
1
 4|1.000|1.000|8.5e-09|1.5e-02|8.8e+03| 7.171203e+03 -2.807097e+01| 0:0:00| chol  1↙
1
 5|0.945|0.971|1.5e-08|4.8e-03|6.3e+02| 5.156800e+02 -2.102252e+01| 0:0:00| chol  1↙
1
 6|0.190|1.000|1.3e-08|4.5e-04|5.3e+02| 5.006316e+02 -1.675950e+01| 0:0:00| chol  1↙
1
 7|0.933|0.740|5.7e-09|1.5e-04|3.8e+02| 3.717222e+02 -7.968017e+00| 0:0:00| chol  1↙
1
 8|1.000|1.000|3.9e-10|4.5e-06|2.1e+02| 2.019680e+02 -5.241209e+00| 0:0:00| chol  1↙
1
 9|1.000|1.000|5.5e-11|4.5e-07|8.7e+01| 8.385163e+01 -3.512040e+00| 0:0:00| chol  1↙
1
10|1.000|1.000|5.3e-13|4.5e-08|3.8e+01| 3.567711e+01 -2.273384e+00| 0:0:00| chol  1↙
1
11|1.000|1.000|2.0e-13|4.5e-09|1.1e+01| 9.300970e+00 -1.795038e+00| 0:0:00| chol  1↙
1
12|1.000|1.000|1.0e-12|4.5e-10|4.0e+00| 2.387713e+00 -1.609497e+00| 0:0:00| chol  1↙
1
13|0.944|0.994|3.4e-12|4.9e-11|7.2e-01|-8.217776e-01 -1.538813e+00| 0:0:00| chol  2↙
2
14|1.000|1.000|3.0e-12|5.5e-12|3.4e-01|-1.162580e+00 -1.499595e+00| 0:0:00| chol  2↙
2
15|1.000|1.000|5.4e-12|1.5e-12|1.3e-01|-1.365727e+00 -1.494696e+00| 0:0:00| chol  2↙
2
16|0.957|0.834|8.6e-12|1.4e-12|1.9e-02|-1.471604e+00 -1.490510e+00| 0:0:00| chol  2↙
3
17|0.627|0.935|7.5e-12|1.7e-12|1.2e-02|-1.478321e+00 -1.490164e+00| 0:0:00| chol  2↙
2
18|1.000|0.884|2.8e-11|1.7e-12|2.3e-03|-1.487633e+00 -1.489962e+00| 0:0:00| chol  3↙
3
19|0.986|0.908|2.4e-10|2.4e-12|6.9e-04|-1.489227e+00 -1.489915e+00| 0:0:00| chol  3↙
4
20|1.000|1.000|2.8e-10|3.4e-12|2.3e-04|-1.489675e+00 -1.489906e+00| 0:0:00| chol  5↙
5
21|1.000|1.000|2.2e-10|5.1e-12|4.7e-05|-1.489857e+00 -1.489904e+00| 0:0:00| chol  8↙
8
22|1.000|1.000|1.8e-09|7.6e-12|1.1e-05|-1.489893e+00 -1.489903e+00| 0:0:00| chol
  warning: symqmr failed: 0.3
  switch to LU factor. lu 30 ^16
23|1.000|1.000|1.0e-09|1.1e-11|1.8e-06|-1.489902e+00 -1.489903e+00| 0:0:00| lu 30 ^↙
6
```

```
24|1.000|0.788|3.0e-09|1.9e-11|2.1e-07|-1.489902e+00 -1.489903e+00| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-------------------------------------------------------------------
 number of iterations   = 24
 primal objective value = -1.48990194e+00
 dual   objective value = -1.48990322e+00
 gap := trace(XZ)       = 2.10e-07
 relative gap           = 5.28e-08
 actual relative gap    = 3.22e-07
 rel. primal infeas     = 2.98e-09
 rel. dual   infeas     = 1.95e-11
 norm(X), norm(y), norm(Z) = 3.8e+01, 1.0e+02, 7.7e+01
 norm(A), norm(b), norm(C) = 2.2e+03, 2.0e+03, 7.9e+01
 Total CPU time (secs)  = 0.29
 CPU time per iteration = 0.01
 termination code       =  0
 DIMACS errors: 6.6e-09  0.0e+00  2.8e-11  0.0e+00  3.2e-07  5.3e-08
-------------------------------------------------------------------

ans =

    1.4899

Iteration   7   Total error is: 0.0049584

 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|8.5e+07| 9.659397e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.990|2.0e-07|1.7e+00|1.1e+06| 9.778602e+04 -2.514976e+02| 0:0:00| chol  1↙
1
 2|1.000|0.933|1.4e-07|2.1e-01|1.6e+05| 6.780297e+04 -1.556105e+01| 0:0:00| chol  1↙
1
 3|0.845|1.000|6.1e-08|5.0e-02|4.5e+04| 3.111636e+04 -4.135515e+01| 0:0:00| chol  1↙
1
 4|1.000|1.000|8.9e-09|1.5e-02|8.6e+03| 6.960885e+03 -2.729978e+01| 0:0:00| chol  1↙
1
 5|0.945|0.970|1.4e-08|4.8e-03|6.2e+02| 5.029382e+02 -2.042868e+01| 0:0:00| chol  1↙
1
 6|0.188|1.000|1.2e-08|4.5e-04|5.1e+02| 4.890511e+02 -1.580398e+01| 0:0:00| chol  1↙
1
 7|0.943|0.753|5.1e-09|1.5e-04|3.7e+02| 3.651430e+02 -7.294408e+00| 0:0:00| chol  1↙
1
 8|1.000|1.000|3.2e-10|4.5e-06|2.0e+02| 1.977188e+02 -4.663921e+00| 0:0:00| chol  1↙
1
 9|1.000|1.000|5.1e-11|4.5e-07|8.4e+01| 8.126240e+01 -2.872314e+00| 0:0:00| chol  1↙
```

```
1
10|1.000|1.000|1.3e-12|4.5e-08|3.7e+01| 3.577629e+01 -1.628243e+00| 0:0:00| chol  1↙
1
11|1.000|1.000|1.0e-13|4.5e-09|1.1e+01| 9.584858e+00 -1.152357e+00| 0:0:00| chol  1↙
1
12|1.000|1.000|5.6e-13|4.5e-10|4.0e+00| 3.017957e+00 -9.665395e-01| 0:0:00| chol  1↙
1
13|0.942|0.987|1.6e-12|5.1e-11|6.8e-01|-2.176087e-01 -8.944555e-01| 0:0:00| chol  2↙
2
14|1.000|0.984|4.9e-12|6.3e-12|3.1e-01|-5.437146e-01 -8.555643e-01| 0:0:00| chol  2↙
2
15|1.000|1.000|7.1e-12|1.5e-12|1.2e-01|-7.266989e-01 -8.511474e-01| 0:0:00| chol  2↙
2
16|0.961|0.844|8.4e-12|1.7e-12|1.4e-02|-8.326747e-01 -8.469137e-01| 0:0:00| chol  2↙
3
17|0.743|0.937|3.2e-11|1.8e-12|6.6e-03|-8.400430e-01 -8.466460e-01| 0:0:00| chol  3↙
3
18|0.887|0.890|8.9e-11|2.7e-12|2.0e-03|-8.444943e-01 -8.465281e-01| 0:0:00| chol  3↙
4
19|1.000|1.000|1.2e-10|3.8e-12|3.8e-04|-8.461189e-01 -8.465036e-01| 0:0:00| chol  4↙
4
20|0.992|0.991|1.3e-10|5.7e-12|3.3e-05|-8.464660e-01 -8.464990e-01| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30 ^22
21|1.000|1.000|6.0e-09|8.5e-12|1.0e-05|-8.464878e-01 -8.464987e-01| 0:0:00| lu 30↙
^11
22|1.000|1.000|8.3e-09|1.3e-11|1.7e-06|-8.464968e-01 -8.464986e-01| 0:0:00| lu 11 ^↙
5
23|0.161|0.164|9.5e-09|3.0e-11|1.5e-06|-8.464985e-01 -8.464986e-01| 0:0:00| lu 11↙
^14
24|0.015|0.043|1.3e-08|5.7e-11|1.5e-06|-8.464988e-01 -8.464986e-01| 0:0:00|
  stop: progress is too slow
  stop: progress is bad
------------------------------------------------------------------
 number of iterations   = 24
 primal objective value = -8.46496832e-01
 dual   objective value = -8.46498602e-01
 gap := trace(XZ)       = 1.71e-06
 relative gap           = 6.33e-07
 actual relative gap    = 6.57e-07
 rel. primal infeas     = 8.27e-09
 rel. dual   infeas     = 1.28e-11
 norm(X), norm(y), norm(Z) = 3.8e+01, 1.0e+02, 7.8e+01
 norm(A), norm(b), norm(C) = 2.2e+03, 2.1e+03, 7.9e+01
 Total CPU time (secs)  = 0.31
 CPU time per iteration = 0.01
 termination code       = -5
 DIMACS errors: 1.8e-08  0.0e+00  1.9e-11  0.0e+00  6.6e-07  6.3e-07
------------------------------------------------------------------

ans =

    0.8465
```

```
Iteration   8   Total error is: 0.0037239
The total representation error of the testing signals is: 0.031281
>>
```