```
>> demo_Polynomial_Dictionary_Learning
Undefined function or variable 'initial_dictionary'.

Error in demo_Polynomial_Dictionary_Learning (line 74)
param.initial_dictionary = initial_dictionary;

>> load('initial_dictionary.mat')
>> 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|4.8e+07| 5.291232e+04  0.000000e+00| 0:0:00| chol  1  1
 1|1.000|0.989|1.5e-07|1.7e+00|6.4e+05| 5.449751e+04 -2.556664e+02| 0:0:00| chol  1  1
 2|1.000|0.916|1.3e-07|1.8e-01|9.1e+04| 4.111434e+04 -1.964292e+01| 0:0:00| chol  1  1
 3|0.854|0.976|3.9e-08|1.5e-02|2.6e+04| 2.238232e+04 -4.429142e+01| 0:0:00| chol  1  1
 4|1.000|1.000|5.4e-09|3.3e-03|2.9e+03| 2.658165e+03 -3.125803e+01| 0:0:00| chol  1  1
 5|0.767|0.726|3.7e-08|1.6e-03|7.5e+02| 6.966538e+02 -2.274300e+01| 0:0:00| chol  1  1
 6|0.243|1.000|2.9e-08|9.8e-05|6.7e+02| 6.559868e+02 -1.531415e+01| 0:0:00| chol  1  1
 7|1.000|1.000|1.4e-09|9.8e-06|4.7e+02| 4.556479e+02 -1.032464e+01| 0:0:00| chol  1  1
 8|1.000|1.000|3.4e-10|9.8e-07|2.1e+02| 2.016382e+02 -6.312675e+00| 0:0:00| chol  1  1
 9|1.000|1.000|4.6e-11|9.8e-08|1.0e+02| 9.986522e+01 -3.543154e+00| 0:0:00| chol  1  1
10|1.000|1.000|5.3e-12|9.8e-09|4.3e+01| 4.182473e+01 -1.547196e+00| 0:0:00| chol  1  1
11|1.000|1.000|7.7e-14|9.8e-10|1.7e+01| 1.630002e+01 -6.587258e-01| 0:0:00| chol  1  1
12|1.000|1.000|2.5e-13|9.9e-11|5.0e+00| 4.824580e+00 -1.785036e-01| 0:0:00| chol  1  1
13|1.000|1.000|5.1e-12|1.1e-11|1.5e+00| 1.450520e+00 -6.707777e-02| 0:0:00| chol  1  2
14|1.000|1.000|3.7e-13|2.0e-12|4.2e-01| 3.853981e-01 -3.225666e-02| 0:0:00| chol  2  2
15|0.972|1.000|1.2e-12|1.1e-12|1.2e-01| 9.788660e-02 -2.399296e-02| 0:0:00| chol  2  2
16|1.000|1.000|5.7e-12|1.0e-12|6.3e-02| 4.127905e-02 -2.172374e-02| 0:0:00| chol  2  2
17|1.000|1.000|1.8e-12|1.1e-12|1.8e-02|-2.896002e-03 -2.087811e-02| 0:0:00| chol  2  2
18|1.000|1.000|4.7e-12|1.0e-12|8.4e-03|-1.212648e-02 -2.054387e-02| 0:0:00| chol  2  2
19|0.962|1.000|3.2e-12|1.0e-12|1.8e-03|-1.855594e-02 -2.039592e-02| 0:0:00| chol  2  3
20|1.000|1.000|5.9e-12|1.0e-12|8.0e-04|-1.956958e-02 -2.037259e-02| 0:0:00| chol  3  3
21|1.000|1.000|1.1e-11|1.2e-12|1.9e-04|-2.016936e-02 -2.036062e-02| 0:0:00| chol  4  4
22|1.000|1.000|9.4e-11|1.8e-12|5.1e-05|-2.030677e-02 -2.035804e-02| 0:0:00| chol  7  8
23|1.000|1.000|5.0e-10|2.7e-12|1.3e-05|-2.034435e-02 -2.035749e-02| 0:0:00| chol 18 28
24|0.984|1.000|4.8e-10|4.0e-12|2.8e-06|-2.035460e-02 -2.035738e-02| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30 ^13
25|0.723|0.586|6.0e-09|7.7e-12|1.1e-06|-2.035576e-02 -2.035736e-02| 0:0:00| lu 30 ^30
26|0.910|0.528|1.2e-08|1.3e-11|6.3e-07|-2.035526e-02 -2.035736e-02| 0:0:00| lu 30 ^11
27|0.335|0.179|7.6e-09|2.4e-11|5.9e-07|-2.035320e-02 -2.035736e-02| 0:0:00| lu 15 ^22
28|0.136|0.201|9.4e-09|3.9e-11|5.6e-07|-2.035427e-02 -2.035736e-02| 0:0:00|
  stop: progress is too slow
  stop: progress is bad
-------------------------------------------------------------------
```

```
 number of iterations   = 28
 primal objective value = -2.03552600e-02
 dual   objective value = -2.03573570e-02
 gap := trace(XZ)       = 6.35e-07
 relative gap           = 6.10e-07
 actual relative gap    = 2.01e-06
 rel. primal infeas     = 1.17e-08
 rel. dual   infeas     = 1.26e-11
 norm(X), norm(y), norm(Z) = 3.7e+01, 1.0e+02, 7.7e+01
 norm(A), norm(b), norm(C) = 2.1e+03, 2.5e+03, 7.9e+01
 Total CPU time (secs)  = 0.48
 CPU time per iteration = 0.02
 termination code       = -5
 DIMACS errors: 2.3e-08  0.0e+00  1.8e-11  0.0e+00  2.0e-06  6.1e-07
------------------------------------------------------------------

ans =

    0.0204


 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|4.8e+07| 5.293815e+04  0.000000e+00| 0:0:00| chol  1  1
 1|1.000|0.989|1.5e-07|1.7e+00|6.4e+05| 5.452370e+04 -2.558038e+02| 0:0:00| chol  1  1
 2|1.000|0.916|1.3e-07|1.8e-01|9.1e+04| 4.113316e+04 -1.963458e+01| 0:0:00| chol  1  1
 3|0.854|0.976|3.9e-08|1.5e-02|2.6e+04| 2.239611e+04 -4.429882e+01| 0:0:00| chol  1  1
 4|1.000|1.000|5.4e-09|3.3e-03|2.9e+03| 2.658793e+03 -3.125837e+01| 0:0:00| chol  1  1
 5|0.767|0.726|3.7e-08|1.6e-03|7.5e+02| 6.971095e+02 -2.274027e+01| 0:0:00| chol  1  1
 6|0.243|1.000|2.9e-08|9.8e-05|6.7e+02| 6.563853e+02 -1.531183e+01| 0:0:00| chol  1  1
 7|1.000|1.000|1.4e-09|9.8e-06|4.7e+02| 4.558888e+02 -1.032348e+01| 0:0:00| chol  1  1
 8|1.000|1.000|3.4e-10|9.8e-07|2.1e+02| 2.017112e+02 -6.310151e+00| 0:0:00| chol  1  1
 9|1.000|1.000|4.7e-11|9.8e-08|1.0e+02| 9.991357e+01 -3.541760e+00| 0:0:00| chol  1  1
10|1.000|1.000|3.4e-13|9.8e-09|4.3e+01| 4.184279e+01 -1.545622e+00| 0:0:00| chol  1  1
11|1.000|1.000|3.5e-13|9.8e-10|1.7e+01| 1.630688e+01 -6.577759e-01| 0:0:00| chol  1  1
12|1.000|1.000|1.3e-13|9.9e-11|5.0e+00| 4.826401e+00 -1.777810e-01| 0:0:00| chol  1  1
13|1.000|1.000|4.6e-12|1.1e-11|1.5e+00| 1.450254e+00 -6.654633e-02| 0:0:00| chol  2  2
14|1.000|1.000|4.3e-13|2.0e-12|4.2e-01| 3.853867e-01 -3.187457e-02| 0:0:00| chol  2  2
15|0.971|1.000|1.5e-12|1.1e-12|1.2e-01| 9.756729e-02 -2.367212e-02| 0:0:00| chol  2  2
16|1.000|1.000|4.0e-12|1.0e-12|6.3e-02| 4.127560e-02 -2.144345e-02| 0:0:00| chol  2  2
17|1.000|1.000|1.4e-12|1.0e-12|1.8e-02|-2.547982e-03 -2.062508e-02| 0:0:00| chol  2  2
18|1.000|1.000|3.5e-12|1.0e-12|8.4e-03|-1.189818e-02 -2.029491e-02| 0:0:00| chol  2  2
19|0.963|1.000|2.5e-12|1.0e-12|1.9e-03|-1.828338e-02 -2.015632e-02| 0:0:00| chol  3  3
20|1.000|1.000|4.1e-12|1.0e-12|8.5e-04|-1.928233e-02 -2.013304e-02| 0:0:00| chol  3  3
21|1.000|1.000|1.9e-11|1.0e-12|2.2e-04|-1.989813e-02 -2.012153e-02| 0:0:00| chol  4  4
22|1.000|1.000|1.7e-11|1.5e-12|7.1e-05|-2.004736e-02 -2.011853e-02| 0:0:00| chol  5  5
23|1.000|1.000|1.7e-10|2.3e-12|1.7e-05|-2.010040e-02 -2.011772e-02| 0:0:00| chol 11 12
```

```
24|1.000|1.000|3.0e-10|3.4e-12|4.0e-06|-2.011356e-02 -2.011756e-02| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30 ^14
25|0.967|1.000|4.0e-09|5.1e-12|9.2e-07|-2.011679e-02 -2.011754e-02| 0:0:00| lu 30 ^10
26|0.379|0.357|9.3e-09|1.1e-11|5.8e-07|-2.011715e-02 -2.011753e-02| 0:0:00| lu 30 ^17
27|0.294|0.232|9.5e-09|2.0e-11|5.4e-07|-2.011480e-02 -2.011753e-02| 0:0:00| lu 20 ^13
28|0.194|0.257|8.8e-09|3.2e-11|5.2e-07|-2.011431e-02 -2.011753e-02| 0:0:00|
  stop: progress is too slow
  stop: progress is bad
-----------------------------------------------------------------
 number of iterations   = 28
 primal objective value = -2.01171509e-02
 dual   objective value = -2.01175339e-02
 gap := trace(XZ)       = 5.82e-07
 relative gap           = 5.60e-07
 actual relative gap    = 3.68e-07
 rel. primal infeas     = 9.33e-09
 rel. dual   infeas     = 1.08e-11
 norm(X), norm(y), norm(Z) = 3.7e+01, 1.0e+02, 7.7e+01
 norm(A), norm(b), norm(C) = 2.1e+03, 2.5e+03, 7.9e+01
 Total CPU time (secs)  = 0.36
 CPU time per iteration = 0.01
 termination code       = -5
 DIMACS errors: 1.9e-08  0.0e+00  1.6e-11  0.0e+00  3.7e-07  5.6e-07
-----------------------------------------------------------------

ans =

    0.0201

Iteration   2   Total error is: 0.00023973

 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|4.8e+07| 5.296649e+04  0.000000e+00| 0:0:00| chol  1  1
 1|1.000|0.989|1.6e-07|1.7e+00|6.4e+05| 5.455185e+04 -2.558369e+02| 0:0:00| chol  1  1
 2|1.000|0.916|1.3e-07|1.8e-01|9.1e+04| 4.115463e+04 -1.962292e+01| 0:0:00| chol  1  1
 3|0.853|0.975|3.9e-08|1.5e-02|2.6e+04| 2.242074e+04 -4.431283e+01| 0:0:00| chol  1  1
 4|1.000|1.000|5.3e-09|3.3e-03|2.9e+03| 2.662651e+03 -3.125975e+01| 0:0:00| chol  1  1
 5|0.767|0.727|3.7e-08|1.6e-03|7.5e+02| 6.969409e+02 -2.274040e+01| 0:0:00| chol  1  1
 6|0.243|1.000|3.0e-08|9.8e-05|6.7e+02| 6.562902e+02 -1.531335e+01| 0:0:00| chol  1  1
 7|1.000|1.000|1.4e-09|9.8e-06|4.7e+02| 4.558710e+02 -1.031690e+01| 0:0:00| chol  1  1
 8|1.000|1.000|3.5e-10|9.8e-07|2.1e+02| 2.017790e+02 -6.310559e+00| 0:0:00| chol  1  1
 9|1.000|1.000|4.6e-11|9.8e-08|1.0e+02| 9.989937e+01 -3.537090e+00| 0:0:00| chol  1  1
10|1.000|1.000|1.6e-12|9.8e-09|4.3e+01| 4.184134e+01 -1.546180e+00| 0:0:00| chol  1  1
11|1.000|1.000|8.4e-13|9.8e-10|1.7e+01| 1.630814e+01 -6.568576e-01| 0:0:00| chol  1  1
12|1.000|1.000|1.0e-13|9.9e-11|5.0e+00| 4.818157e+00 -1.777182e-01| 0:0:00| chol  1  1
```

```
13|1.000|1.000|1.8e-12|1.1e-11|1.5e+00| 1.450956e+00 -6.671999e-02| 0:0:00| chol  1  2
14|1.000|1.000|3.3e-13|2.0e-12|4.1e-01| 3.819993e-01 -3.209756e-02| 0:0:00| chol  2  2
15|0.972|1.000|9.5e-13|1.1e-12|1.2e-01| 9.719886e-02 -2.394145e-02| 0:0:00| chol  2  2
16|1.000|1.000|1.0e-11|1.0e-12|6.3e-02| 4.101405e-02 -2.172075e-02| 0:0:00| chol  2  2
17|1.000|1.000|1.7e-12|1.5e-12|1.8e-02|-2.878119e-03 -2.089872e-02| 0:0:00| chol  2  2
18|1.000|1.000|3.5e-12|1.0e-12|8.4e-03|-1.217470e-02 -2.057000e-02| 0:0:00| chol  2  2
19|0.963|1.000|6.1e-12|1.0e-12|1.9e-03|-1.855448e-02 -2.043072e-02| 0:0:00| chol  3  3
20|1.000|1.000|1.7e-11|1.2e-12|8.6e-04|-1.955038e-02 -2.040714e-02| 0:0:00| chol  2  3
21|1.000|1.000|8.8e-12|1.8e-12|2.3e-04|-2.016758e-02 -2.039544e-02| 0:0:00| chol  4  4
22|1.000|1.000|2.2e-11|1.8e-12|7.4e-05|-2.031787e-02 -2.039232e-02| 0:0:00| chol  5  5
23|1.000|1.000|1.1e-10|2.6e-12|1.7e-05|-2.037405e-02 -2.039152e-02| 0:0:00| chol 12 12
24|1.000|1.000|7.2e-10|4.0e-12|5.0e-06|-2.038638e-02 -2.039135e-02| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30 ^ 6
25|1.000|1.000|9.3e-10|6.0e-12|1.6e-06|-2.038945e-02 -2.039131e-02| 0:0:00| lu 30 ^ 7
26|0.594|0.515|5.0e-09|1.2e-11|8.7e-07|-2.039067e-02 -2.039131e-02| 0:0:00| lu 30 ^ 4
27|0.198|0.133|4.9e-09|2.4e-11|8.3e-07|-2.038956e-02 -2.039131e-02| 0:0:00| lu 14  30
28|0.780|0.400|2.0e-08|3.4e-11|7.2e-07|-2.039129e-02 -2.039131e-02| 0:0:00|
  stop: progress is too slow
-----------------------------------------------------------------
 number of iterations   = 28
 primal objective value = -2.03906745e-02
 dual   objective value = -2.03913067e-02
 gap := trace(XZ)       = 8.74e-07
 relative gap           = 8.40e-07
 actual relative gap    = 6.07e-07
 rel. primal infeas     = 4.96e-09
 rel. dual   infeas     = 1.18e-11
 norm(X), norm(y), norm(Z) = 3.7e+01, 1.0e+02, 7.7e+01
 norm(A), norm(b), norm(C) = 2.1e+03, 2.5e+03, 7.9e+01
 Total CPU time (secs)  = 0.39
 CPU time per iteration = 0.01
 termination code       = -5
 DIMACS errors: 9.8e-09  0.0e+00  1.7e-11  0.0e+00  6.1e-07  8.4e-07
-----------------------------------------------------------------

ans =

    0.0204

Iteration   3   Total error is: 0.00025121

 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|4.8e+07| 5.298816e+04  0.000000e+00| 0:0:00| chol  1  1
 1|1.000|0.989|1.6e-07|1.7e+00|6.4e+05| 5.457345e+04 -2.558866e+02| 0:0:00| chol  1  1
 2|1.000|0.916|1.3e-07|1.8e-01|9.1e+04| 4.117094e+04 -1.962111e+01| 0:0:00| chol  1  1
```

```
 3|0.853|0.975|3.9e-08|1.5e-02|2.6e+04| 2.243729e+04 -4.432636e+01| 0:0:00| chol  1  1
 4|1.000|1.000|5.4e-09|3.3e-03|2.9e+03| 2.665136e+03 -3.126467e+01| 0:0:00| chol  1  1
 5|0.767|0.727|3.7e-08|1.6e-03|7.5e+02| 6.969459e+02 -2.274331e+01| 0:0:00| chol  1  1
 6|0.243|1.000|3.0e-08|9.8e-05|6.7e+02| 6.563311e+02 -1.531558e+01| 0:0:00| chol  1  1
 7|1.000|1.000|1.4e-09|9.8e-06|4.7e+02| 4.559331e+02 -1.031413e+01| 0:0:00| chol  1  1
 8|1.000|1.000|3.4e-10|9.8e-07|2.1e+02| 2.018487e+02 -6.310876e+00| 0:0:00| chol  1  1
 9|1.000|1.000|4.6e-11|9.8e-08|1.0e+02| 9.990723e+01 -3.534691e+00| 0:0:00| chol  1  1
10|1.000|1.000|7.2e-13|9.8e-09|4.3e+01| 4.184741e+01 -1.546179e+00| 0:0:00| chol  1  1
11|1.000|1.000|1.4e-13|9.8e-10|1.7e+01| 1.631055e+01 -6.561643e-01| 0:0:00| chol  1  1
12|1.000|1.000|6.7e-14|9.9e-11|5.0e+00| 4.814615e+00 -1.774694e-01| 0:0:00| chol  1  1
13|1.000|1.000|2.7e-13|1.1e-11|1.5e+00| 1.451253e+00 -6.662944e-02| 0:0:00| chol  2  2
14|1.000|1.000|5.7e-13|2.0e-12|4.1e-01| 3.803841e-01 -3.206395e-02| 0:0:00| chol  2  2
15|0.973|1.000|7.3e-13|1.1e-12|1.2e-01| 9.699110e-02 -2.394656e-02| 0:0:00| chol  2  2
16|1.000|1.000|3.6e-12|1.0e-12|6.3e-02| 4.091808e-02 -2.174014e-02| 0:0:00| chol  2  2
17|1.000|1.000|3.5e-12|1.0e-12|1.8e-02|-2.953535e-03 -2.092160e-02| 0:0:00| chol  2  2
18|1.000|1.000|2.0e-12|1.0e-12|8.4e-03|-1.222442e-02 -2.059589e-02| 0:0:00| chol  2  2
19|0.963|1.000|1.3e-12|1.0e-12|1.9e-03|-1.859515e-02 -2.045790e-02| 0:0:00| chol  2  3
20|1.000|1.000|1.6e-11|1.0e-12|8.5e-04|-1.958644e-02 -2.043481e-02| 0:0:00| chol  3  3
21|1.000|1.000|6.3e-12|1.5e-12|2.2e-04|-2.020184e-02 -2.042339e-02| 0:0:00| chol  4  4
22|1.000|1.000|5.6e-11|1.3e-12|6.6e-05|-2.035428e-02 -2.042050e-02| 0:0:00| chol  5  5
23|0.975|1.000|4.3e-11|1.9e-12|1.3e-05|-2.040642e-02 -2.041989e-02| 0:0:00| chol
  warning: symqmr failed: 0.3
  switch to LU factor. lu 30   2
24|0.967|1.000|7.4e-10|2.8e-12|3.5e-06|-2.041621e-02 -2.041979e-02| 0:0:00| lu 25  30
25|1.000|1.000|1.7e-08|4.3e-12|1.7e-06|-2.041929e-02 -2.041978e-02| 0:0:00| lu 11  30
26|0.195|0.193|2.2e-08|9.8e-12|1.4e-06|-2.041798e-02 -2.041978e-02| 0:0:00| lu 30 ^28
27|0.153|0.165|3.7e-08|1.8e-11|1.3e-06|-2.041717e-02 -2.041978e-02| 0:0:00|
  stop: progress is too slow
-----------------------------------------------------------------
 number of iterations   = 27
 primal objective value = -2.04171728e-02
 dual   objective value = -2.04197751e-02
 gap := trace(XZ)       = 1.30e-06
 relative gap           = 1.25e-06
 actual relative gap    = 2.50e-06
 rel. primal infeas     = 3.71e-08
 rel. dual   infeas     = 1.78e-11
 norm(X), norm(y), norm(Z) = 3.7e+01, 1.0e+02, 7.7e+01
 norm(A), norm(b), norm(C) = 2.1e+03, 2.5e+03, 7.9e+01
 Total CPU time (secs)  = 0.39
 CPU time per iteration = 0.01
 termination code       = -5
 DIMACS errors: 7.4e-08  0.0e+00  2.6e-11  0.0e+00  2.5e-06  1.2e-06
-----------------------------------------------------------------

ans =

    0.0204

Iteration   4   Total error is: 0.00025282

 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|4.8e+07| 5.300925e+04  0.000000e+00| 0:0:00| chol  1  1
 1|1.000|0.989|1.6e-07|1.7e+00|6.4e+05| 5.459446e+04 -2.559424e+02| 0:0:00| chol  1  1
 2|1.000|0.916|1.3e-07|1.8e-01|9.1e+04| 4.118673e+04 -1.962075e+01| 0:0:00| chol  1  1
 3|0.853|0.975|3.9e-08|1.5e-02|2.6e+04| 2.245188e+04 -4.433866e+01| 0:0:00| chol  1  1
 4|1.000|1.000|5.4e-09|3.3e-03|2.9e+03| 2.667254e+03 -3.126959e+01| 0:0:00| chol  1  1
 5|0.767|0.727|3.7e-08|1.6e-03|7.5e+02| 6.969730e+02 -2.274624e+01| 0:0:00| chol  1  1
 6|0.242|1.000|3.0e-08|9.8e-05|6.7e+02| 6.563879e+02 -1.531747e+01| 0:0:00| chol  1  1
 7|1.000|1.000|1.4e-09|9.8e-06|4.7e+02| 4.560051e+02 -1.031188e+01| 0:0:00| chol  1  1
 8|1.000|1.000|3.3e-10|9.8e-07|2.1e+02| 2.019143e+02 -6.310877e+00| 0:0:00| chol  1  1
 9|1.000|1.000|4.9e-11|9.8e-08|1.0e+02| 9.991795e+01 -3.532707e+00| 0:0:00| chol  1  1
10|1.000|1.000|3.3e-12|9.8e-09|4.3e+01| 4.185367e+01 -1.545934e+00| 0:0:00| chol  1  1
11|1.000|1.000|2.1e-13|9.8e-10|1.7e+01| 1.631257e+01 -6.554657e-01| 0:0:00| chol  1  1
12|1.000|1.000|8.0e-14|9.9e-11|5.0e+00| 4.812061e+00 -1.771361e-01| 0:0:00| chol  1  1
13|1.000|1.000|4.1e-12|1.1e-11|1.5e+00| 1.451475e+00 -6.644289e-02| 0:0:00| chol  2  2
14|1.000|1.000|1.9e-13|2.0e-12|4.1e-01| 3.792276e-01 -3.194342e-02| 0:0:00| chol  2  2
15|0.974|1.000|1.7e-12|1.1e-12|1.2e-01| 9.672868e-02 -2.387460e-02| 0:0:00| chol  2  2
16|1.000|1.000|8.1e-12|1.0e-12|6.2e-02| 4.079696e-02 -2.168820e-02| 0:0:00| chol  2  2
17|1.000|1.000|3.8e-12|1.5e-12|1.8e-02|-2.988567e-03 -2.087952e-02| 0:0:00| chol  2  2
18|1.000|1.000|2.4e-12|1.0e-12|8.3e-03|-1.222819e-02 -2.055894e-02| 0:0:00| chol  2  2
19|0.963|1.000|7.9e-12|1.0e-12|1.8e-03|-1.858691e-02 -2.042376e-02| 0:0:00| chol  3  3
20|1.000|1.000|4.5e-12|1.5e-12|8.3e-04|-1.957101e-02 -2.040166e-02| 0:0:00| chol  3  3
21|1.000|1.000|1.1e-11|1.0e-12|2.1e-04|-2.018041e-02 -2.039070e-02| 0:0:00| chol  4  4
22|1.000|1.000|7.4e-11|1.5e-12|5.6e-05|-2.033198e-02 -2.038800e-02| 0:0:00| chol  6  6
23|0.808|0.970|9.6e-11|2.3e-12|1.8e-05|-2.036997e-02 -2.038758e-02| 0:0:00| chol 25 30
24|0.902|1.000|2.4e-09|3.4e-12|4.8e-06|-2.038290e-02 -2.038749e-02| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30  30
25|1.000|1.000|2.3e-09|5.1e-12|2.1e-06|-2.038490e-02 -2.038747e-02| 0:0:00| lu 30 ^ 7
26|1.000|1.000|1.2e-08|7.6e-12|5.7e-07|-2.038738e-02 -2.038746e-02| 0:0:00| lu 11  30
27|0.014|0.015|1.6e-08|1.9e-11|5.6e-07|-2.038762e-02 -2.038746e-02| 0:0:00| lu 23 ^21
28|0.049|0.104|1.9e-08|3.4e-11|5.6e-07|-2.038826e-02 -2.038746e-02| 0:0:00|
  stop: progress is too slow
  stop: progress is bad
  stop: steps too short consecutively
-------------------------------------------------------------------
 number of iterations   = 28
 primal objective value = -2.03873805e-02
 dual   objective value = -2.03874633e-02
 gap := trace(XZ)       = 5.71e-07
 relative gap           = 5.49e-07
 actual relative gap    = 7.96e-08
 rel. primal infeas     = 1.21e-08
 rel. dual   infeas     = 7.59e-12
 norm(X), norm(y), norm(Z) = 3.7e+01, 1.0e+02, 7.7e+01
 norm(A), norm(b), norm(C) = 2.1e+03, 2.5e+03, 7.9e+01
 Total CPU time (secs)  = 0.45
 CPU time per iteration = 0.02
 termination code       = -5
 DIMACS errors: 2.4e-08  0.0e+00  1.1e-11  0.0e+00  8.0e-08  5.5e-07
```

```
-----------------------------------------------------------------

ans =

    0.0204

Iteration   5   Total error is: 0.00025209

 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|4.8e+07| 5.303000e+04  0.000000e+00| 0:0:00| chol  1  1
 1|1.000|0.989|1.6e-07|1.7e+00|6.4e+05| 5.461514e+04 -2.559793e+02| 0:0:00| chol  1  1
 2|1.000|0.916|1.3e-07|1.8e-01|9.1e+04| 4.120227e+04 -1.961883e+01| 0:0:00| chol  1  1
 3|0.853|0.975|3.9e-08|1.5e-02|2.6e+04| 2.246532e+04 -4.434807e+01| 0:0:00| chol  1  1
 4|1.000|1.000|5.5e-09|3.3e-03|2.9e+03| 2.669473e+03 -3.127242e+01| 0:0:00| chol  1  1
 5|0.767|0.727|3.7e-08|1.6e-03|7.5e+02| 6.969252e+02 -2.274778e+01| 0:0:00| chol  1  1
 6|0.242|1.000|3.0e-08|9.8e-05|6.7e+02| 6.563779e+02 -1.531847e+01| 0:0:00| chol  1  1
 7|1.000|1.000|1.4e-09|9.8e-06|4.7e+02| 4.560352e+02 -1.030887e+01| 0:0:00| chol  1  1
 8|1.000|1.000|3.4e-10|9.8e-07|2.1e+02| 2.019601e+02 -6.310565e+00| 0:0:00| chol  1  1
 9|1.000|1.000|4.7e-11|9.8e-08|1.0e+02| 9.991844e+01 -3.530456e+00| 0:0:00| chol  1  1
10|1.000|1.000|2.8e-12|9.8e-09|4.3e+01| 4.185609e+01 -1.545703e+00| 0:0:00| chol  1  1
11|1.000|1.000|1.1e-12|9.8e-10|1.7e+01| 1.631328e+01 -6.547911e-01| 0:0:00| chol  1  1
12|1.000|1.000|1.7e-13|9.9e-11|5.0e+00| 4.808953e+00 -1.768645e-01| 0:0:00| chol  1  1
13|1.000|1.000|2.0e-12|1.1e-11|1.5e+00| 1.451571e+00 -6.631878e-02| 0:0:00| chol  1  2
14|1.000|1.000|3.5e-13|2.0e-12|4.1e-01| 3.779399e-01 -3.188182e-02| 0:0:00| chol  2  2
15|0.974|1.000|1.0e-12|1.1e-12|1.2e-01| 9.643945e-02 -2.385827e-02| 0:0:00| chol  2  2
16|1.000|1.000|7.2e-12|1.0e-12|6.2e-02| 4.063595e-02 -2.168988e-02| 0:0:00| chol  2  2
17|1.000|1.000|2.5e-12|1.4e-12|1.8e-02|-3.088303e-03 -2.088877e-02| 0:0:00| chol  2  2
18|1.000|1.000|2.6e-12|1.0e-12|8.3e-03|-1.228704e-02 -2.057308e-02| 0:0:00| chol  2  2
19|0.962|1.000|1.5e-12|1.0e-12|1.8e-03|-1.863438e-02 -2.043983e-02| 0:0:00| chol  3  3
20|1.000|1.000|1.8e-11|1.0e-12|8.1e-04|-1.961132e-02 -2.041854e-02| 0:0:00| chol  2  3
21|1.000|1.000|7.5e-12|1.5e-12|2.0e-04|-2.021000e-02 -2.040786e-02| 0:0:00| chol  4  4
22|1.000|1.000|4.5e-11|1.5e-12|4.7e-05|-2.035842e-02 -2.040533e-02| 0:0:00| chol  6  8
23|0.704|0.925|1.7e-10|2.4e-12|1.9e-05|-2.038633e-02 -2.040509e-02| 0:0:00| chol 26 19
24|0.922|1.000|6.5e-10|3.4e-12|5.0e-06|-2.040002e-02 -2.040498e-02| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30  30
25|1.000|0.993|5.8e-10|5.1e-12|1.8e-06|-2.040314e-02 -2.040496e-02| 0:0:00| lu 30 ^11
26|0.974|0.915|3.9e-10|8.0e-12|9.0e-08|-2.040477e-02 -2.040495e-02| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-----------------------------------------------------------------
 number of iterations   = 26
 primal objective value = -2.04047653e-02
 dual   objective value = -2.04049479e-02
 gap := trace(XZ)       = 9.01e-08
 relative gap           = 8.66e-08
 actual relative gap    = 1.75e-07
```

```
 rel. primal infeas     = 3.95e-10
 rel. dual   infeas     = 8.00e-12
 norm(X), norm(y), norm(Z) = 3.7e+01, 1.0e+02, 7.7e+01
 norm(A), norm(b), norm(C) = 2.1e+03, 2.5e+03, 7.9e+01
 Total CPU time (secs)  = 0.34
 CPU time per iteration = 0.01
 termination code       =  0
 DIMACS errors: 7.8e-10  0.0e+00  1.2e-11  0.0e+00  1.8e-07  8.7e-08
------------------------------------------------------------------

ans =

    0.0204

Iteration   6   Total error is: 0.00025301

 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|4.8e+07| 5.305040e+04  0.000000e+00| 0:0:00| chol  1  1
 1|1.000|0.989|1.6e-07|1.7e+00|6.4e+05| 5.463548e+04 -2.560076e+02| 0:0:00| chol  1  1
 2|1.000|0.916|1.3e-07|1.8e-01|9.1e+04| 4.121754e+04 -1.961630e+01| 0:0:00| chol  1  1
 3|0.853|0.975|3.9e-08|1.5e-02|2.6e+04| 2.247764e+04 -4.435563e+01| 0:0:00| chol  1  1
 4|1.000|1.000|5.4e-09|3.3e-03|2.9e+03| 2.671629e+03 -3.127418e+01| 0:0:00| chol  1  1
 5|0.768|0.727|3.8e-08|1.6e-03|7.5e+02| 6.968490e+02 -2.274860e+01| 0:0:00| chol  1  1
 6|0.242|1.000|3.0e-08|9.8e-05|6.7e+02| 6.563415e+02 -1.531885e+01| 0:0:00| chol  1  1
 7|1.000|1.000|1.4e-09|9.8e-06|4.7e+02| 4.560488e+02 -1.030556e+01| 0:0:00| chol  1  1
 8|1.000|1.000|3.5e-10|9.8e-07|2.1e+02| 2.019960e+02 -6.309916e+00| 0:0:00| chol  1  1
 9|1.000|1.000|4.8e-11|9.8e-08|1.0e+02| 9.991508e+01 -3.528154e+00| 0:0:00| chol  1  1
10|1.000|1.000|7.1e-12|9.8e-09|4.3e+01| 4.185658e+01 -1.545349e+00| 0:0:00| chol  1  1
11|1.000|1.000|3.8e-13|9.8e-10|1.7e+01| 1.631317e+01 -6.540853e-01| 0:0:00| chol  1  1
12|1.000|1.000|3.0e-13|9.9e-11|5.0e+00| 4.805852e+00 -1.765608e-01| 0:0:00| chol  1  1
13|1.000|1.000|9.6e-13|1.1e-11|1.5e+00| 1.451618e+00 -6.616324e-02| 0:0:00| chol  2  2
14|1.000|1.000|4.5e-13|2.0e-12|4.1e-01| 3.767637e-01 -3.179029e-02| 0:0:00| chol  2  2
15|0.975|1.000|1.1e-12|1.1e-12|1.2e-01| 9.614549e-02 -2.381407e-02| 0:0:00| chol  2  2
16|1.000|1.000|4.3e-12|1.0e-12|6.2e-02| 4.047625e-02 -2.166455e-02| 0:0:00| chol  2  2
17|1.000|1.000|1.9e-12|1.0e-12|1.8e-02|-3.172599e-03 -2.087225e-02| 0:0:00| chol  2  2
18|1.000|1.000|1.9e-12|1.0e-12|8.2e-03|-1.232648e-02 -2.056189e-02| 0:0:00| chol  2  2
19|0.961|1.000|4.2e-12|1.0e-12|1.8e-03|-1.866027e-02 -2.043068e-02| 0:0:00| chol  3  3
20|1.000|1.000|1.0e-11|1.0e-12|7.8e-04|-1.962836e-02 -2.041016e-02| 0:0:00| chol  3  3
21|1.000|1.000|8.8e-12|1.5e-12|1.9e-04|-2.021272e-02 -2.039981e-02| 0:0:00| chol  4  4
22|1.000|1.000|9.2e-11|1.8e-12|4.1e-05|-2.035650e-02 -2.039745e-02| 0:0:00| chol  9  8
23|0.700|0.899|1.8e-10|2.8e-12|1.7e-05|-2.038036e-02 -2.039728e-02| 0:0:00| chol 16 13
24|0.930|1.000|2.5e-10|4.0e-12|4.6e-06|-2.039265e-02 -2.039718e-02| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30  30
25|1.000|1.000|3.5e-09|5.9e-12|1.3e-06|-2.039580e-02 -2.039716e-02| 0:0:00| lu 30  30
26|0.730|0.655|5.0e-09|1.1e-11|5.3e-07|-2.039599e-02 -2.039715e-02| 0:0:00| lu 15 ^ 7
```

```
27|0.414|0.491|3.9e-09|1.9e-11|3.9e-07|-2.039621e-02 -2.039715e-02| 0:0:00| lu 14 ^24
28|0.069|0.183|4.1e-09|3.6e-11|3.9e-07|-2.039587e-02 -2.039715e-02| 0:0:00| lu 30 ^11
29|0.110|0.291|7.8e-09|5.5e-11|3.8e-07|-2.039607e-02 -2.039715e-02| 0:0:00|
  stop: progress is too slow
  stop: progress is bad
-----------------------------------------------------------------
 number of iterations   = 29
 primal objective value = -2.03962082e-02
 dual   objective value = -2.03971535e-02
 gap := trace(XZ)       = 3.91e-07
 relative gap           = 3.76e-07
 actual relative gap    = 9.08e-07
 rel. primal infeas     = 3.94e-09
 rel. dual   infeas     = 1.90e-11
 norm(X), norm(y), norm(Z) = 3.7e+01, 1.0e+02, 7.7e+01
 norm(A), norm(b), norm(C) = 2.1e+03, 2.5e+03, 7.9e+01
 Total CPU time (secs)  = 0.41
 CPU time per iteration = 0.01
 termination code       = -5
 DIMACS errors: 7.8e-09  0.0e+00  2.8e-11  0.0e+00  9.1e-07  3.8e-07
-----------------------------------------------------------------

ans =

    0.0204

Iteration   7   Total error is: 0.00025303

 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|4.8e+07| 5.307051e+04  0.000000e+00| 0:0:00| chol  1  1
 1|1.000|0.989|1.6e-07|1.7e+00|6.4e+05| 5.465552e+04 -2.560314e+02| 0:0:00| chol  1  1
 2|1.000|0.916|1.3e-07|1.8e-01|9.1e+04| 4.123257e+04 -1.961363e+01| 0:0:00| chol  1  1
 3|0.853|0.975|3.9e-08|1.5e-02|2.6e+04| 2.248917e+04 -4.436207e+01| 0:0:00| chol  1  1
 4|1.000|1.000|5.5e-09|3.3e-03|2.9e+03| 2.673729e+03 -3.127535e+01| 0:0:00| chol  1  1
 5|0.768|0.728|3.8e-08|1.6e-03|7.5e+02| 6.967525e+02 -2.274903e+01| 0:0:00| chol  1  1
 6|0.242|1.000|3.0e-08|9.8e-05|6.7e+02| 6.562864e+02 -1.531889e+01| 0:0:00| chol  1  1
 7|1.000|1.000|1.4e-09|9.8e-06|4.7e+02| 4.560512e+02 -1.030212e+01| 0:0:00| chol  1  1
 8|1.000|1.000|3.4e-10|9.8e-07|2.1e+02| 2.020251e+02 -6.309097e+00| 0:0:00| chol  1  1
 9|1.000|1.000|4.7e-11|9.8e-08|1.0e+02| 9.990913e+01 -3.525862e+00| 0:0:00| chol  1  1
10|1.000|1.000|3.5e-12|9.8e-09|4.3e+01| 4.185584e+01 -1.544943e+00| 0:0:00| chol  1  1
11|1.000|1.000|4.4e-13|9.8e-10|1.7e+01| 1.631249e+01 -6.533886e-01| 0:0:00| chol  1  1
12|1.000|1.000|1.5e-13|9.9e-11|5.0e+00| 4.802760e+00 -1.762628e-01| 0:0:00| chol  1  1
13|1.000|1.000|2.9e-12|1.1e-11|1.5e+00| 1.451594e+00 -6.601199e-02| 0:0:00| chol  2  2
14|1.000|1.000|3.0e-13|2.0e-12|4.1e-01| 3.756427e-01 -3.170234e-02| 0:0:00| chol  2  2
15|0.975|1.000|6.7e-13|1.1e-12|1.2e-01| 9.585268e-02 -2.377172e-02| 0:0:00| chol  2  2
16|1.000|1.000|4.6e-12|1.0e-12|6.2e-02| 4.031450e-02 -2.164060e-02| 0:0:00| chol  2  2
```

```
17|1.000|1.000|1.7e-12|1.0e-12|1.8e-02|-3.262325e-03 -2.085660e-02| 0:0:00| chol  2  2
18|1.000|1.000|1.8e-12|1.0e-12|8.2e-03|-1.236972e-02 -2.055146e-02| 0:0:00| chol  2  2
19|0.960|1.000|1.5e-12|1.0e-12|1.7e-03|-1.868742e-02 -2.042200e-02| 0:0:00| chol  3  3
20|1.000|1.000|4.6e-12|1.0e-12|7.6e-04|-1.964534e-02 -2.040215e-02| 0:0:00| chol  3  3
21|1.000|1.000|1.4e-11|1.0e-12|1.8e-04|-2.021387e-02 -2.039214e-02| 0:0:00| chol  4  4
22|1.000|1.000|4.0e-11|1.5e-12|3.7e-05|-2.035336e-02 -2.038992e-02| 0:0:00| chol  8  9
23|0.837|0.867|2.2e-10|2.4e-12|1.1e-05|-2.037858e-02 -2.038976e-02| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30   7
24|1.000|1.000|3.8e-10|3.4e-12|2.5e-06|-2.038712e-02 -2.038967e-02| 0:0:00| lu 30 ^ 9
25|1.000|0.979|4.7e-10|5.1e-12|1.6e-07|-2.038958e-02 -2.038965e-02| 0:0:00| lu 30 ^26
26|0.927|0.797|1.1e-09|8.6e-12|1.7e-08|-2.038940e-02 -2.038965e-02| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
------------------------------------------------------------------
 number of iterations   = 26
 primal objective value = -2.03893995e-02
 dual   objective value = -2.03896528e-02
 gap := trace(XZ)       = 1.71e-08
 relative gap           = 1.65e-08
 actual relative gap    = 2.43e-07
 rel. primal infeas     = 1.08e-09
 rel. dual   infeas     = 8.63e-12
 norm(X), norm(y), norm(Z) = 3.7e+01, 1.0e+02, 7.7e+01
 norm(A), norm(b), norm(C) = 2.1e+03, 2.5e+03, 7.9e+01
 Total CPU time (secs)  = 0.30
 CPU time per iteration = 0.01
 termination code       =  0
 DIMACS errors: 2.1e-09  0.0e+00  1.3e-11  0.0e+00  2.4e-07  1.6e-08
------------------------------------------------------------------

ans =

    0.0204

Iteration   8   Total error is: 0.00025307
The total representation error of the testing signals is: 0.018952
>>
```