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

 num. of constraints = 25
 dim. of socp   var  = 26,   num. of socp blk  =  1
 dim. of linear var  = 800
 4 linear variables from unrestricted variable.

 *** convert ublk to linear blk
********************************************************************************* ↙
******
   SDPT3: homogeneous self-dual path-following algorithms
********************************************************************************* ↙
******
 version  predcorr  gam  expon
   HKM      1      0.000   1
it pstep dstep pinfeas dinfeas  gap     mean(obj)    cputime    kap   tau    theta
------------------------------------------------------------------------------- ↙
------
 0|0.000|0.000|2.2e+00|5.1e+01|1.3e+06| 1.128062e+04| 0:0:00|1.3e+06|1.0e+00|1.0e+00| ↙
chol 1  1
 1|0.921|0.921|1.7e-01|3.9e+00|1.1e+05| 1.025081e+04| 0:0:00|6.1e+04|1.0e+00|8.0e-02| ↙
chol 1  1
 2|0.107|0.107|1.7e-01|3.9e+00|1.2e+05| 1.092373e+04| 0:0:00|5.7e+04|9.9e-01|7.7e-02| ↙
chol 1  1
 3|0.755|0.755|1.3e-01|3.2e+00|1.5e+05| 1.427580e+04| 0:0:00|2.6e+04|7.9e-01|4.9e-02| ↙
chol 1  1
 4|0.889|0.889|6.3e-02|1.5e+00|7.3e+04| 1.029039e+04| 0:0:00|1.5e+03|8.4e-01|2.5e-02| ↙
chol 1  1
 5|0.712|0.712|2.1e-02|4.9e-01|1.9e+04| 4.031497e+03| 0:0:00|5.7e+01|1.1e+00|1.0e-02| ↙
chol 1  1
 6|0.946|0.946|1.9e-03|4.6e-02|1.5e+03| 4.458028e+02| 0:0:00|1.3e+01|1.3e+00|1.2e-03| ↙
chol 1  1
 7|1.000|1.000|1.0e-03|2.4e-02|9.4e+02| 2.843362e+02| 0:0:00|2.7e+00|1.3e+00|6.2e-04| ↙
chol 1  1
 8|1.000|1.000|4.3e-04|1.0e-02|3.9e+02| 1.132659e+02| 0:0:00|1.4e+00|1.3e+00|2.6e-04| ↙
chol 1  1
 9|1.000|1.000|2.5e-04|5.9e-03|2.2e+02| 6.125411e+01| 0:0:00|6.1e-01|1.3e+00|1.5e-04| ↙
chol 1  1
10|1.000|1.000|9.7e-05|2.4e-03|8.5e+01| 1.809097e+01| 0:0:00|3.4e-01|1.4e+00|6.1e-05| ↙
chol 1  1
11|1.000|1.000|4.4e-05|1.1e-03|3.7e+01| 3.410332e+00| 0:0:00|1.3e-01|1.4e+00|2.8e-05| ↙
chol 1  1
12|1.000|1.000|1.3e-05|4.4e-04|1.1e+01|-5.159927e+00| 0:0:00|5.6e-02|1.5e+00|8.9e-06| ↙
chol 1  1
13|1.000|1.000|5.0e-06|2.8e-04|3.8e+00|-7.366743e+00| 0:0:00|1.5e-02|1.6e+00|3.7e-06| ↙
chol 1  1
14|0.977|0.977|8.4e-07|2.1e-04|5.7e-01|-8.507465e+00| 0:0:00|5.8e-03|1.7e+00|6.8e-07| ↙
chol 1  1
15|1.000|1.000|2.3e-07|1.9e-04|1.4e-01|-8.647970e+00| 0:0:00|6.5e-04|1.9e+00|2.0e-07| ↙
chol 1  1
16|0.978|0.978|7.8e-09|1.7e-04|4.5e-03|-8.702536e+00| 0:0:00|3.1e-04|2.0e+00|7.1e-09| ↙
chol 1  1
17|0.988|0.988|2.8e-10|8.8e-06|1.5e-04|-8.704014e+00| 0:0:00|1.5e-05|2.0e+00|2.5e-10| ↙
```

```
chol 1  1
18|1.000|1.000|2.6e-10|2.7e-07|1.4e-05|-8.704056e+00| 0:0:00|3.8e-07|2.0e+00|2.2e-11| ↙
chol 1  1
19|0.991|0.991|1.6e-08|2.7e-07|3.4e-07|-8.704063e+00| 0:0:00|3.7e-08|2.0e+00|0.0e+00| ↙
chol 1  1
20|0.995|0.995|1.4e-08|2.7e-07|7.5e-09|-8.704063e+00| 0:0:00|1.0e-09|2.0e+00|0.0e+00|
  Stop: relative gap < infeasibility
-----------------------------------------------------------------
 number of iterations   = 20
 primal objective value = -8.70406325e+00
 dual   objective value = -8.70406295e+00
 gap := trace(XZ)       = 3.39e-07
 relative gap           = 3.50e-08
 actual relative gap    = -1.62e-08
 rel. primal infeas     = 1.59e-08
 rel. dual   infeas     = 2.73e-07
 norm(X), norm(y), norm(Z) = 3.9e+00, 6.0e+01, 2.1e+01
 norm(A), norm(b), norm(C) = 7.9e+02, 1.1e+00, 2.8e+01
 Total CPU time (secs)  = 0.31
 CPU time per iteration = 0.02
 termination code       = -1
 DIMACS errors: 1.6e-08  0.0e+00  2.7e-07  0.0e+00  -1.6e-08  1.8e-08
-----------------------------------------------------------------

ans =

    8.7041


 num. of constraints = 25
 dim. of socp   var  = 26,   num. of socp blk  =  1
 dim. of linear var  = 800
 2 linear variables from unrestricted variable.

 *** convert ublk to linear blk
********************************************************************************* ↙
******
   SDPT3: homogeneous self-dual path-following algorithms
********************************************************************************* ↙
******
 version  predcorr  gam  expon
   HKM      1      0.000   1
it pstep dstep pinfeas dinfeas  gap     mean(obj)    cputime    kap   tau    theta
------------------------------------------------------------------------------- ↙
------
 0|0.000|0.000|3.0e+00|5.1e+01|1.3e+06| 1.126472e+04| 0:0:00|1.3e+06|1.0e+00|1.0e+00| ↙
chol 1  1
 1|0.912|0.912|2.6e-01|4.4e+00|1.2e+05| 1.027211e+04| 0:0:00|7.4e+04|1.0e+00|9.0e-02| ↙
chol 1  1
 2|0.484|0.484|2.5e-01|4.4e+00|1.8e+05| 1.391716e+04| 0:0:00|5.2e+04|8.4e-01|7.2e-02| ↙
chol 1  1
 3|1.000|1.000|1.2e-01|2.1e+00|1.1e+05| 1.323292e+04| 0:0:00|4.3e+03|7.7e-01|3.2e-02| ↙
chol 1  1
 4|0.682|0.682|4.5e-02|7.7e-01|3.1e+04| 5.854015e+03| 0:0:00|1.8e+02|1.0e+00|1.5e-02| ↙
chol 1  1
```

```
 5|0.878|0.878|6.7e-03|1.1e-01|3.7e+03| 1.036130e+03| 0:0:00|5.5e+00|1.3e+00|2.9e-03| ↙
chol 1  1
 6|0.907|0.907|1.6e-03|2.8e-02|9.6e+02| 2.915483e+02| 0:0:00|5.5e+00|1.3e+00|7.3e-04| ↙
chol 1  1
 7|1.000|1.000|1.1e-03|1.8e-02|7.0e+02| 2.163480e+02| 0:0:00|1.8e+00|1.3e+00|4.6e-04| ↙
chol 1  1
 8|1.000|1.000|5.2e-04|8.9e-03|3.4e+02| 1.009800e+02| 0:0:00|1.1e+00|1.3e+00|2.3e-04| ↙
chol 1  1
 9|1.000|1.000|2.5e-04|4.3e-03|1.6e+02| 4.582697e+01| 0:0:00|5.2e-01|1.3e+00|1.1e-04| ↙
chol 1  1
10|1.000|1.000|1.1e-04|2.0e-03|6.9e+01| 1.676380e+01| 0:0:00|2.4e-01|1.4e+00|4.9e-05| ↙
chol 1  1
11|1.000|1.000|4.6e-05|8.9e-04|2.8e+01| 4.462189e+00| 0:0:00|1.1e-01|1.4e+00|2.2e-05| ↙
chol 1  1
12|1.000|1.000|1.3e-05|3.7e-04|7.7e+00|-2.198639e+00| 0:0:00|4.2e-02|1.5e+00|6.5e-06| ↙
chol 1  1
13|0.963|0.963|6.1e-06|2.7e-04|3.3e+00|-3.415232e+00| 0:0:00|1.2e-02|1.6e+00|3.2e-06| ↙
chol 1  1
14|1.000|1.000|3.1e-06|2.2e-04|1.6e+00|-3.997132e+00| 0:0:00|5.6e-03|1.7e+00|1.8e-06| ↙
chol 1  1
15|1.000|1.000|1.4e-06|1.9e-04|7.0e-01|-4.283667e+00| 0:0:00|3.0e-03|1.8e+00|8.6e-07| ↙
chol 1  1
16|1.000|1.000|5.0e-07|1.7e-04|2.3e-01|-4.454537e+00| 0:0:00|1.4e-03|1.9e+00|3.1e-07| ↙
chol 1  1
17|1.000|1.000|1.8e-07|1.5e-04|8.0e-02|-4.505652e+00| 0:0:00|4.8e-04|1.9e+00|1.2e-07| ↙
chol 1  1
18|1.000|1.000|4.4e-08|1.4e-04|1.9e-02|-4.527592e+00| 0:0:00|1.8e-04|1.9e+00|2.9e-08| ↙
chol 1  1
19|1.000|1.000|1.5e-08|5.5e-05|6.7e-03|-4.531865e+00| 0:0:00|4.5e-05|2.0e+00|1.0e-08| ↙
chol 1  1
20|1.000|1.000|3.7e-09|2.2e-05|1.6e-03|-4.533804e+00| 0:0:00|1.6e-05|2.0e+00|2.4e-09| ↙
chol 1  1
21|1.000|1.000|1.6e-09|8.8e-06|7.1e-04|-4.534124e+00| 0:0:00|3.8e-06|2.0e+00|1.1e-09| ↙
chol 1  1
22|0.975|0.975|3.5e-10|3.7e-06|1.3e-04|-4.534364e+00| 0:0:00|1.7e-06|2.0e+00|2.0e-10| ↙
chol 1  1
23|0.994|0.994|6.2e-11|1.6e-07|4.4e-05|-4.534396e+00| 0:0:00|3.2e-07|2.0e+00|6.7e-11| ↙
chol 1  1
24|1.000|1.000|1.1e-10|1.4e-07|1.1e-05|-4.534412e+00| 0:0:00|1.1e-07|2.0e+00|1.7e-11| ↙
chol 1  1
25|1.000|1.000|4.0e-09|1.4e-07|1.6e-06|-4.534417e+00| 0:0:00|2.6e-08|2.0e+00|2.1e-12| ↙
chol 1  1
26|1.000|1.000|1.1e-08|1.4e-07|1.1e-07|-4.534417e+00| 0:0:00|3.8e-09|2.0e+00|0.0e+00| ↙
chol 1  1
27|1.000|1.000|2.9e-08|1.4e-07|2.3e-09|-4.534418e+00| 0:0:00|2.6e-10|2.0e+00|0.0e+00|
  Stop: relative gap < infeasibility
-----------------------------------------------------------------
 number of iterations   = 27
 primal objective value = -4.53441775e+00
 dual   objective value = -4.53441719e+00
 gap := trace(XZ)       = 1.07e-07
 relative gap           = 1.93e-08
 actual relative gap    = -5.49e-08
 rel. primal infeas     = 1.14e-08
 rel. dual   infeas     = 1.41e-07
```

```
 norm(X), norm(y), norm(Z) = 7.1e+00, 4.7e+01, 2.4e+01
 norm(A), norm(b), norm(C) = 7.9e+02, 1.7e+00, 2.8e+01
 Total CPU time (secs)  = 0.20
 CPU time per iteration = 0.01
 termination code       = -1
 DIMACS errors: 1.1e-08  0.0e+00  1.4e-07  0.0e+00  -5.5e-08  1.1e-08
------------------------------------------------------------------

ans =

    4.5344

Iteration   2   Total error is: 0.0082866

 num. of constraints = 25
 dim. of socp   var  = 26,   num. of socp blk  =  1
 dim. of linear var  = 800
 2 linear variables from unrestricted variable.

 *** convert ublk to linear blk
********************************************************************************* ↙
******
   SDPT3: homogeneous self-dual path-following algorithms
********************************************************************************* ↙
******
 version  predcorr  gam  expon
   HKM      1      0.000   1
it pstep dstep pinfeas dinfeas  gap     mean(obj)    cputime    kap   tau    theta
------------------------------------------------------------------------------- ↙
------
 0|0.000|0.000|2.4e+00|5.1e+01|1.5e+06| 1.315190e+04| 0:0:00|1.5e+06|1.0e+00|1.0e+00| ↙
chol 1  1
 1|0.874|0.874|3.0e-01|6.3e+00|2.0e+05| 1.205027e+04| 0:0:00|1.5e+05|1.0e+00|1.3e-01| ↙
chol 1  1
 2|0.609|0.609|3.4e-01|7.3e+00|4.3e+05| 2.176779e+04| 0:0:00|1.0e+05|7.1e-01|1.0e-01| ↙
chol 1  1
 3|1.000|1.000|2.4e-01|5.1e+00|4.6e+05| 2.927804e+04| 0:0:00|2.4e+04|5.5e-01|5.5e-02| ↙
chol 1  1
 4|0.601|0.601|1.0e-01|2.2e+00|1.4e+05| 1.513889e+04| 0:0:00|1.0e+03|7.5e-01|3.2e-02| ↙
chol 1  1
 5|0.743|0.743|3.2e-02|6.9e-01|3.5e+04| 6.649826e+03| 0:0:00|4.3e+01|9.7e-01|1.3e-02| ↙
chol 1  1
 6|0.928|0.928|3.6e-03|7.7e-02|3.2e+03| 8.488858e+02| 0:0:00|2.9e+01|1.3e+00|1.9e-03| ↙
chol 1  1
 7|1.000|1.000|2.3e-03|4.8e-02|2.3e+03| 6.794040e+02| 0:0:00|5.7e+00|1.2e+00|1.2e-03| ↙
chol 1  1
 8|1.000|1.000|9.0e-04|1.9e-02|9.1e+02| 2.609203e+02| 0:0:00|3.3e+00|1.2e+00|4.8e-04| ↙
chol 1  1
 9|1.000|1.000|4.7e-04|1.0e-02|4.7e+02| 1.350389e+02| 0:0:00|1.3e+00|1.3e+00|2.5e-04| ↙
chol 1  1
10|1.000|1.000|2.0e-04|4.3e-03|1.9e+02| 5.141162e+01| 0:0:00|6.9e-01|1.3e+00|1.1e-04| ↙
chol 1  1
11|1.000|1.000|8.5e-05|1.9e-03|8.1e+01| 1.990100e+01| 0:0:00|2.8e-01|1.3e+00|4.8e-05| ↙
chol 1  1
12|1.000|1.000|3.2e-05|7.7e-04|2.9e+01| 4.412724e+00| 0:0:00|1.2e-01|1.4e+00|1.8e-05| ↙
```

```
chol 1  1
13|1.000|1.000|1.2e-05|3.8e-04|1.1e+01|-8.421006e-01| 0:0:00|4.3e-02|1.4e+00|7.6e-06| ↙
chol 1  1
14|1.000|1.000|3.9e-06|2.4e-04|3.2e+00|-3.204309e+00| 0:0:00|1.6e-02|1.5e+00|2.5e-06| ↙
chol 1  1
15|1.000|1.000|1.8e-06|2.0e-04|1.4e+00|-3.708428e+00| 0:0:00|4.5e-03|1.7e+00|1.3e-06| ↙
chol 1  1
16|1.000|1.000|5.6e-07|1.7e-04|3.9e-01|-4.035160e+00| 0:0:00|2.5e-03|1.8e+00|4.3e-07| ↙
chol 1  1
17|1.000|1.000|2.2e-07|1.5e-04|1.5e-01|-4.114361e+00| 0:0:00|7.6e-04|1.9e+00|1.8e-07| ↙
chol 1  1
18|1.000|1.000|4.7e-08|1.4e-04|3.0e-02|-4.155309e+00| 0:0:00|3.2e-04|1.9e+00|3.9e-08| ↙
chol 1  1
19|1.000|1.000|1.8e-08|5.5e-05|1.2e-02|-4.161388e+00| 0:0:00|7.1e-05|1.9e+00|1.5e-08| ↙
chol 1  1
20|1.000|1.000|4.6e-09|2.2e-05|2.9e-03|-4.164538e+00| 0:0:00|2.7e-05|2.0e+00|3.8e-09| ↙
chol 1  1
21|1.000|1.000|1.9e-09|8.8e-06|1.2e-03|-4.165134e+00| 0:0:00|6.9e-06|2.0e+00|1.6e-09| ↙
chol 1  1
22|0.993|0.993|3.8e-10|3.6e-06|2.2e-04|-4.165522e+00| 0:0:00|2.9e-06|2.0e+00|2.9e-10| ↙
chol 1  1
23|0.954|0.954|1.7e-10|1.5e-06|1.0e-04|-4.165569e+00| 0:0:00|6.4e-07|2.0e+00|1.3e-10| ↙
chol 1  1
24|0.197|0.197|9.9e-11|1.3e-06|9.7e-05|-4.165573e+00| 0:0:00|5.6e-07|2.0e+00|1.2e-10| ↙
chol 1  1
25|0.485|0.485|7.7e-10|6.9e-07|7.9e-05|-4.165583e+00| 0:0:00|4.0e-07|2.0e+00|9.5e-11| ↙
chol 1  1
26|0.388|0.388|1.7e-09|4.3e-07|7.0e-05|-4.165590e+00| 0:0:00|3.2e-07|2.0e+00|8.0e-11| ↙
chol 1  1
27|0.185|0.185|2.6e-09|3.5e-07|6.8e-05|-4.165593e+00| 0:0:00|2.9e-07|1.9e+00|7.4e-11| ↙
chol 1  1
28|0.637|0.637|3.4e-09|1.4e-07|5.0e-05|-4.165604e+00| 0:0:00|2.1e-07|1.9e+00|5.5e-11| ↙
chol 1  1
29|0.209|0.209|1.5e-08|1.1e-07|4.8e-05|-4.165608e+00| 0:0:00|1.9e-07|1.9e+00|5.1e-11| ↙
chol 1  1
30|0.289|0.289|1.8e-08|8.2e-08|4.4e-05|-4.165611e+00| 0:0:00|1.7e-07|1.9e+00|4.7e-11| ↙
chol 1  1
31|0.657|0.657|1.3e-08|3.6e-08|3.1e-05|-4.165620e+00| 0:0:00|1.3e-07|1.9e+00|3.5e-11| ↙
chol 1  1
32|0.528|0.528|2.1e-08|2.3e-08|2.6e-05|-4.165623e+00| 0:0:00|9.8e-08|1.9e+00|3.0e-11| ↙
chol 1  1
33|0.057|0.057|3.0e-08|2.3e-08|2.6e-05|-4.165623e+00| 0:0:00|9.7e-08|1.9e+00|3.0e-11|
  Stop: progress is too slow
-----------------------------------------------------------------
 number of iterations   = 33
 primal objective value = -4.16561220e+00
 dual   objective value = -4.16563408e+00
 gap := trace(XZ)       = 2.59e-05
 relative gap           = 5.01e-06
 actual relative gap    = 2.35e-06
 rel. primal infeas     = 3.04e-08
 rel. dual   infeas     = 2.25e-08
 norm(X), norm(y), norm(Z) = 9.3e+02, 4.5e+01, 2.5e+01
 norm(A), norm(b), norm(C) = 7.9e+02, 2.8e+00, 2.8e+01
 Total CPU time (secs)  = 0.27
```

```
 CPU time per iteration = 0.01
 termination code       = -5
 DIMACS errors: 3.0e-08  0.0e+00  2.3e-08  0.0e+00  2.3e-06  2.8e-06
------------------------------------------------------------------

ans =

    4.1656

Iteration   3   Total error is: 0.0079723

 num. of constraints = 25
 dim. of socp   var  = 26,   num. of socp blk  =  1
 dim. of linear var  = 800
 2 linear variables from unrestricted variable.

 *** convert ublk to linear blk
********************************************************************************
******
   SDPT3: homogeneous self-dual path-following algorithms
********************************************************************************
******
 version  predcorr  gam  expon
   HKM      1      0.000   1
it pstep dstep pinfeas dinfeas  gap     mean(obj)    cputime    kap   tau    theta
------------------------------------------------------------------------------
------
 0|0.000|0.000|2.9e+00|5.1e+01|1.3e+06| 1.126342e+04| 0:0:00|1.3e+06|1.0e+00|1.0e+00|
chol 1  1
 1|0.878|0.878|3.5e-01|6.1e+00|1.6e+05| 1.030339e+04| 0:0:00|1.2e+05|1.0e+00|1.2e-01|
chol 1  1
 2|0.625|0.625|4.2e-01|7.2e+00|3.8e+05| 1.914212e+04| 0:0:00|8.4e+04|6.9e-01|9.9e-02|
chol 1  1
 3|1.000|1.000|3.5e-01|6.0e+00|5.1e+05| 2.866530e+04| 0:0:00|2.4e+04|5.0e-01|5.9e-02|
chol 1  1
 4|0.586|0.586|1.5e-01|2.6e+00|1.5e+05| 1.518316e+04| 0:0:00|1.1e+03|6.9e-01|3.5e-02|
chol 1  1
 5|0.751|0.751|5.1e-02|8.8e-01|4.3e+04| 7.398630e+03| 0:0:00|4.7e+01|8.9e-01|1.5e-02|
chol 1  1
 6|0.982|0.982|4.0e-03|7.0e-02|2.7e+03| 7.122217e+02| 0:0:00|2.8e+01|1.2e+00|1.7e-03|
chol 1  1
 7|0.957|0.957|3.0e-03|5.1e-02|2.1e+03| 6.021078e+02| 0:0:00|5.9e+00|1.2e+00|1.2e-03|
chol 1  1
 8|1.000|1.000|1.4e-03|2.4e-02|9.9e+02| 2.682284e+02| 0:0:00|3.0e+00|1.2e+00|5.8e-04|
chol 1  1
 9|1.000|1.000|8.1e-04|1.4e-02|5.7e+02| 1.569441e+02| 0:0:00|1.4e+00|1.2e+00|3.4e-04|
chol 1  1
10|1.000|1.000|2.8e-04|4.9e-03|1.9e+02| 4.912734e+01| 0:0:00|8.1e-01|1.3e+00|1.2e-04|
chol 1  1
11|1.000|1.000|1.3e-04|2.3e-03|8.7e+01| 2.078305e+01| 0:0:00|2.7e-01|1.3e+00|5.7e-05|
chol 1  1
12|1.000|1.000|4.3e-05|8.4e-04|2.8e+01| 3.924884e+00| 0:0:00|1.3e-01|1.3e+00|2.0e-05|
chol 1  1
13|1.000|1.000|1.8e-05|4.2e-04|1.1e+01|-7.227241e-01| 0:0:00|4.0e-02|1.4e+00|8.7e-06|
chol 1  1
```

```
14|1.000|1.000|5.7e-06|2.5e-04|3.3e+00|-3.091281e+00| 0:0:00|1.6e-02|1.5e+00|2.9e-06| ↙
chol 1  1
15|1.000|1.000|2.4e-06|2.0e-04|1.2e+00|-3.682624e+00| 0:0:00|4.5e-03|1.6e+00|1.3e-06| ↙
chol 1  1
16|1.000|1.000|6.6e-07|1.7e-04|3.2e-01|-3.981578e+00| 0:0:00|2.1e-03|1.8e+00|4.0e-07| ↙
chol 1  1
17|1.000|1.000|2.3e-07|1.5e-04|1.1e-01|-4.048872e+00| 0:0:00|5.9e-04|1.9e+00|1.5e-07| ↙
chol 1  1
18|0.981|0.981|4.0e-08|1.4e-04|1.8e-02|-4.080485e+00| 0:0:00|2.4e-04|1.9e+00|2.6e-08| ↙
chol 1  1
19|0.981|0.981|8.0e-09|5.7e-05|3.5e-03|-4.085399e+00| 0:0:00|4.4e-05|2.0e+00|5.3e-09| ↙
chol 1  1
20|0.376|0.376|6.6e-09|4.4e-05|2.9e-03|-4.085594e+00| 0:0:00|3.1e-05|2.0e+00|4.4e-09| ↙
chol 1  1
21|0.574|0.574|4.1e-09|2.4e-05|1.9e-03|-4.085945e+00| 0:0:00|1.7e-05|2.0e+00|2.9e-09| ↙
chol 1  1
22|0.683|0.683|2.3e-09|9.9e-06|1.1e-03|-4.086260e+00| 0:0:00|8.5e-06|2.0e+00|1.6e-09| ↙
chol 1  1
23|0.539|0.539|1.6e-09|5.4e-06|8.0e-04|-4.086391e+00| 0:0:00|5.4e-06|1.9e+00|1.1e-09| ↙
chol 1  1
24|0.386|0.386|1.1e-09|3.5e-06|6.7e-04|-4.086462e+00| 0:0:00|4.0e-06|1.9e+00|9.2e-10| ↙
chol 1  1
25|0.469|0.469|6.0e-10|2.0e-06|5.1e-04|-4.086537e+00| 0:0:00|2.9e-06|1.9e+00|7.0e-10| ↙
chol 1  1
26|0.439|0.439|5.1e-10|1.2e-06|4.1e-04|-4.086590e+00| 0:0:00|2.2e-06|1.9e+00|5.5e-10| ↙
chol 1  1
27|0.350|0.350|1.1e-09|7.7e-07|3.6e-04|-4.086624e+00| 0:0:00|1.8e-06|1.9e+00|4.6e-10| ↙
chol 1  1
28|0.670|0.670|1.7e-09|2.7e-07|2.4e-04|-4.086684e+00| 0:0:00|1.1e-06|1.9e+00|3.1e-10| ↙
chol 1  1
29|0.126|0.126|3.4e-09|2.4e-07|2.3e-04|-4.086690e+00| 0:0:00|1.1e-06|1.9e+00|3.0e-10| ↙
chol 1  1
30|0.666|0.666|7.3e-09|8.1e-08|1.8e-04|-4.086725e+00| 0:0:00|7.4e-07|1.9e+00|2.2e-10| ↙
chol 1  1
31|0.128|0.128|1.1e-08|7.2e-08|1.8e-04|-4.086729e+00| 0:0:00|7.0e-07|1.8e+00|2.2e-10| ↙
chol 1  1
32|0.240|0.240|1.7e-08|5.6e-08|1.7e-04|-4.086738e+00| 0:0:00|6.4e-07|1.8e+00|2.0e-10| ↙
chol 1  1
33|0.743|0.743|2.2e-08|1.6e-08|1.2e-04|-4.086772e+00| 0:0:00|4.7e-07|1.7e+00|1.3e-10| ↙
chol 1  1
34|0.696|0.696|2.8e-08|5.7e-09|7.5e-05|-4.086795e+00| 0:0:00|3.3e-07|1.7e+00|8.1e-11| ↙
chol 1  1
35|0.869|0.869|6.9e-08|2.2e-09|5.7e-05|-4.086805e+00| 0:0:00|2.0e-07|1.6e+00|6.0e-11| ↙
chol 1  1
36|0.093|0.093|9.9e-08|2.2e-09|5.8e-05|-4.086805e+00| 0:0:00|1.9e-07|1.6e+00|6.1e-11| ↙
chol 1  1
37|0.414|0.414|1.0e-07|1.9e-09|5.3e-05|-4.086810e+00| 0:0:00|1.6e-07|1.5e+00|5.3e-11|
  Stop: progress is too slow
---------------------------------------------------------------------
 number of iterations   = 37
 primal objective value = -4.08678770e+00
 dual   objective value = -4.08683232e+00
 gap := trace(XZ)       = 5.25e-05
 relative gap           = 1.03e-05
 actual relative gap    = 4.86e-06
```

```
 rel. primal infeas     = 1.01e-07
 rel. dual   infeas     = 1.88e-09
 norm(X), norm(y), norm(Z) = 4.8e+03, 4.5e+01, 2.5e+01
 norm(A), norm(b), norm(C) = 7.9e+02, 2.4e+00, 2.8e+01
 Total CPU time (secs)  = 0.34
 CPU time per iteration = 0.01
 termination code       = -5
 DIMACS errors: 1.0e-07  0.0e+00  1.9e-09  0.0e+00  4.9e-06  5.7e-06
------------------------------------------------------------------

ans =

    4.0868

Iteration   4   Total error is: 0.00789

 num. of constraints = 25
 dim. of socp   var  = 26,   num. of socp blk  =  1
 dim. of linear var  = 800
 2 linear variables from unrestricted variable.

 *** convert ublk to linear blk
********************************************************************************* ↙
******
   SDPT3: homogeneous self-dual path-following algorithms
********************************************************************************* ↙
******
 version  predcorr  gam  expon
   HKM      1      0.000   1
it pstep dstep pinfeas dinfeas  gap     mean(obj)    cputime    kap   tau    theta
------------------------------------------------------------------------------------ ↙
------
 0|0.000|0.000|2.5e+00|5.1e+01|1.4e+06| 1.242364e+04| 0:0:00|1.4e+06|1.0e+00|1.0e+00| ↙
chol 1  1
 1|0.873|0.873|3.2e-01|6.4e+00|1.9e+05| 1.137811e+04| 0:0:00|1.4e+05|1.0e+00|1.3e-01| ↙
chol 1  1
 2|0.675|0.675|3.9e-01|7.8e+00|4.8e+05| 2.275978e+04| 0:0:00|9.6e+04|6.6e-01|1.0e-01| ↙
chol 1  1
 3|1.000|1.000|3.1e-01|6.1e+00|5.8e+05| 3.241871e+04| 0:0:00|2.5e+04|4.9e-01|5.9e-02| ↙
chol 1  1
 4|0.586|0.586|1.3e-01|2.7e+00|1.8e+05| 1.733855e+04| 0:0:00|1.1e+03|6.8e-01|3.5e-02| ↙
chol 1  1
 5|0.755|0.755|4.6e-02|9.1e-01|5.0e+04| 8.530218e+03| 0:0:00|5.0e+01|8.8e-01|1.6e-02| ↙
chol 1  1
 6|1.000|1.000|3.1e-03|6.2e-02|2.8e+03| 7.386015e+02| 0:0:00|3.3e+01|1.2e+00|1.5e-03| ↙
chol 1  1
 7|0.961|0.961|2.3e-03|4.5e-02|2.1e+03| 5.872908e+02| 0:0:00|6.0e+00|1.2e+00|1.1e-03| ↙
chol 1  1
 8|1.000|1.000|1.1e-03|2.2e-02|9.9e+02| 2.716337e+02| 0:0:00|2.9e+00|1.2e+00|5.3e-04| ↙
chol 1  1
 9|1.000|1.000|5.8e-04|1.2e-02|5.2e+02| 1.433446e+02| 0:0:00|1.4e+00|1.2e+00|2.8e-04| ↙
chol 1  1
10|1.000|1.000|2.2e-04|4.5e-03|1.9e+02| 5.014980e+01| 0:0:00|7.4e-01|1.3e+00|1.1e-04| ↙
chol 1  1
11|1.000|1.000|9.8e-05|2.0e-03|8.3e+01| 1.968510e+01| 0:0:00|2.8e-01|1.3e+00|5.0e-05| ↙
```

```
chol 1  1
12|1.000|1.000|3.5e-05|7.8e-04|2.9e+01| 4.061966e+00| 0:0:00|1.2e-01|1.3e+00|1.8e-05| ↙
chol 1  1
13|1.000|1.000|1.4e-05|3.9e-04|1.1e+01|-7.316784e-01| 0:0:00|4.1e-02|1.4e+00|7.9e-06| ↙
chol 1  1
14|1.000|1.000|4.6e-06|2.4e-04|3.3e+00|-3.032693e+00| 0:0:00|1.6e-02|1.5e+00|2.7e-06| ↙
chol 1  1
15|1.000|1.000|1.8e-06|2.0e-04|1.2e+00|-3.631208e+00| 0:0:00|4.6e-03|1.7e+00|1.2e-06| ↙
chol 1  1
16|1.000|1.000|5.1e-07|1.7e-04|3.1e-01|-3.926590e+00| 0:0:00|2.1e-03|1.8e+00|3.7e-07| ↙
chol 1  1
17|1.000|1.000|1.8e-07|1.5e-04|1.0e-01|-3.993911e+00| 0:0:00|5.9e-04|1.9e+00|1.3e-07| ↙
chol 1  1
18|0.985|0.985|2.7e-08|1.4e-04|1.5e-02|-4.024211e+00| 0:0:00|2.3e-04|1.9e+00|2.1e-08| ↙
chol 1  1
19|0.880|0.880|1.5e-08|6.5e-05|8.2e-03|-4.026614e+00| 0:0:00|5.9e-05|2.0e+00|1.1e-08| ↙
chol 1  1
20|0.858|0.858|4.1e-09|2.8e-05|2.2e-03|-4.028907e+00| 0:0:00|2.5e-05|2.0e+00|3.1e-09| ↙
chol 1  1
21|0.316|0.316|3.5e-09|2.2e-05|2.0e-03|-4.029023e+00| 0:0:00|1.9e-05|2.0e+00|2.7e-09| ↙
chol 1  1
22|0.352|0.352|2.8e-09|1.6e-05|1.6e-03|-4.029179e+00| 0:0:00|1.4e-05|2.0e+00|2.1e-09| ↙
chol 1  1
23|0.699|0.699|1.6e-09|5.7e-06|9.5e-04|-4.029447e+00| 0:0:00|6.8e-06|1.9e+00|1.2e-09| ↙
chol 1  1
24|0.327|0.327|1.3e-09|4.0e-06|8.5e-04|-4.029507e+00| 0:0:00|5.3e-06|1.9e+00|1.1e-09| ↙
chol 1  1
25|0.387|0.387|9.3e-10|2.6e-06|6.9e-04|-4.029586e+00| 0:0:00|4.1e-06|1.9e+00|8.5e-10| ↙
chol 1  1
26|0.468|0.468|5.6e-10|1.4e-06|5.4e-04|-4.029663e+00| 0:0:00|2.9e-06|1.9e+00|6.5e-10| ↙
chol 1  1
27|0.541|0.541|3.3e-10|6.7e-07|4.0e-04|-4.029734e+00| 0:0:00|2.0e-06|1.9e+00|4.7e-10| ↙
chol 1  1
28|0.495|0.495|7.5e-10|3.5e-07|3.1e-04|-4.029777e+00| 0:0:00|1.5e-06|1.9e+00|3.7e-10| ↙
chol 1  1
29|0.486|0.486|1.4e-09|1.9e-07|2.5e-04|-4.029812e+00| 0:0:00|1.1e-06|1.9e+00|2.9e-10| ↙
chol 1  1
30|0.580|0.580|1.2e-09|8.2e-08|1.7e-04|-4.029851e+00| 0:0:00|8.1e-07|1.9e+00|2.0e-10| ↙
chol 1  1
31|0.939|0.939|1.6e-10|1.7e-08|8.3e-05|-4.029892e+00| 0:0:00|4.2e-07|1.9e+00|1.0e-10| ↙
chol 1  1
32|0.524|0.524|1.4e-09|1.6e-08|6.8e-05|-4.029901e+00| 0:0:00|3.0e-07|1.9e+00|8.5e-11| ↙
chol 1  1
33|1.000|1.000|4.8e-09|1.4e-08|3.0e-05|-4.029918e+00| 0:0:00|1.5e-07|1.9e+00|3.8e-11| ↙
chol 1  1
34|0.940|0.940|1.1e-08|1.3e-08|1.2e-05|-4.029927e+00| 0:0:00|7.4e-08|1.9e+00|1.4e-11| ↙
chol 1  1
35|1.000|1.000|2.2e-08|1.3e-08|1.0e-06|-4.029933e+00| 0:0:00|2.6e-08|1.9e+00|0.0e+00| ↙
chol 1  1
36|1.000|1.000|3.7e-08|1.3e-08|4.3e-08|-4.029933e+00| 0:0:00|2.4e-09|1.9e+00|0.0e+00|
  Stop: max(relative gap,infeasibilities) < 1.00e-07
------------------------------------------------------------------
 number of iterations   = 36
 primal objective value = -4.02994018e+00
 dual   objective value = -4.02992669e+00
```

```
 gap := trace(XZ)       = 4.30e-08
 relative gap           = 8.55e-09
 actual relative gap    = -1.49e-06
 rel. primal infeas     = 3.67e-08
 rel. dual   infeas     = 1.28e-08
 norm(X), norm(y), norm(Z) = 1.6e+03, 4.4e+01, 2.5e+01
 norm(A), norm(b), norm(C) = 7.9e+02, 2.8e+00, 2.8e+01
 Total CPU time (secs)  = 0.31
 CPU time per iteration = 0.01
 termination code       =  0
 DIMACS errors: 3.7e-08  0.0e+00  1.3e-08  0.0e+00  -1.5e-06  4.7e-09
------------------------------------------------------------------

ans =

    4.0299

Iteration   5   Total error is: 0.0078342

 num. of constraints = 25
 dim. of socp   var  = 26,   num. of socp blk  =  1
 dim. of linear var  = 800
 2 linear variables from unrestricted variable.

 *** convert ublk to linear blk
********************************************************************************* ↙
******
   SDPT3: homogeneous self-dual path-following algorithms
********************************************************************************* ↙
******
 version  predcorr  gam  expon
   HKM      1      0.000   1
it pstep dstep pinfeas dinfeas  gap     mean(obj)    cputime    kap   tau    theta
------------------------------------------------------------------------------------ ↙
------
 0|0.000|0.000|2.9e+00|5.1e+01|1.3e+06| 1.126224e+04| 0:0:00|1.3e+06|1.0e+00|1.0e+00| ↙
chol 1  1
 1|0.871|0.871|3.7e-01|6.5e+00|1.7e+05| 1.032089e+04| 0:0:00|1.3e+05|1.0e+00|1.3e-01| ↙
chol 1  1
 2|0.718|0.718|4.7e-01|8.2e+00|4.9e+05| 2.197936e+04| 0:0:00|8.7e+04|6.3e-01|1.0e-01| ↙
chol 1  1
 3|1.000|1.000|3.3e-01|5.7e+00|4.9e+05| 2.860914e+04| 0:0:00|1.9e+04|5.0e-01|5.6e-02| ↙
chol 1  1
 4|0.593|0.593|1.4e-01|2.6e+00|1.5e+05| 1.536557e+04| 0:0:00|8.6e+02|6.8e-01|3.4e-02| ↙
chol 1  1
 5|0.755|0.755|4.8e-02|8.5e-01|4.1e+04| 7.230444e+03| 0:0:00|3.8e+01|9.0e-01|1.5e-02| ↙
chol 1  1
 6|1.000|1.000|3.1e-03|5.4e-02|2.2e+03| 5.707137e+02| 0:0:00|3.0e+01|1.2e+00|1.3e-03| ↙
chol 1  1
 7|0.867|0.867|2.3e-03|4.0e-02|1.6e+03| 4.593755e+02| 0:0:00|7.4e+00|1.2e+00|9.5e-04| ↙
chol 1  1
 8|1.000|1.000|1.2e-03|2.2e-02|9.0e+02| 2.468771e+02| 0:0:00|2.3e+00|1.2e+00|5.3e-04| ↙
chol 1  1
 9|1.000|1.000|5.8e-04|1.0e-02|4.1e+02| 1.141354e+02| 0:0:00|1.3e+00|1.2e+00|2.5e-04| ↙
chol 1  1
```

```
10|1.000|1.000|2.4e-04|4.4e-03|1.7e+02| 4.341939e+01| 0:0:00|6.0e-01|1.3e+00|1.1e-04| ↙
chol 1  1
11|1.000|1.000|1.0e-04|1.9e-03|6.9e+01| 1.576170e+01| 0:0:00|2.5e-01|1.3e+00|4.6e-05| ↙
chol 1  1
12|1.000|1.000|3.7e-05|7.5e-04|2.4e+01| 2.899586e+00| 0:0:00|1.0e-01|1.4e+00|1.7e-05| ↙
chol 1  1
13|1.000|1.000|1.5e-05|3.8e-04|9.3e+00|-1.224872e+00| 0:0:00|3.5e-02|1.4e+00|7.3e-06| ↙
chol 1  1
14|1.000|1.000|4.9e-06|2.4e-04|2.8e+00|-3.138159e+00| 0:0:00|1.3e-02|1.5e+00|2.6e-06| ↙
chol 1  1
15|1.000|1.000|2.0e-06|2.0e-04|1.0e+00|-3.649945e+00| 0:0:00|4.0e-03|1.7e+00|1.1e-06| ↙
chol 1  1
16|1.000|1.000|5.5e-07|1.7e-04|2.7e-01|-3.900033e+00| 0:0:00|1.8e-03|1.8e+00|3.5e-07| ↙
chol 1  1
17|1.000|1.000|1.8e-07|1.5e-04|8.1e-02|-3.958905e+00| 0:0:00|5.0e-04|1.9e+00|1.2e-07| ↙
chol 1  1
18|0.899|0.899|3.7e-08|1.4e-04|1.7e-02|-3.981231e+00| 0:0:00|2.1e-04|1.9e+00|2.5e-08| ↙
chol 1  1
19|0.594|0.594|2.6e-08|9.0e-05|1.2e-02|-3.982837e+00| 0:0:00|1.1e-04|1.9e+00|1.8e-08| ↙
chol 1  1
20|0.934|0.934|5.2e-09|2.7e-05|2.2e-03|-3.986445e+00| 0:0:00|3.3e-05|2.0e+00|3.4e-09| ↙
chol 1  1
21|0.356|0.356|4.4e-09|2.0e-05|2.0e-03|-3.986549e+00| 0:0:00|2.3e-05|2.0e+00|2.9e-09| ↙
chol 1  1
22|0.902|0.902|1.3e-09|5.2e-06|5.8e-04|-3.987074e+00| 0:0:00|6.5e-06|2.0e+00|8.7e-10| ↙
chol 1  1
23|0.920|0.920|6.2e-10|1.7e-06|3.1e-04|-3.987183e+00| 0:0:00|1.8e-06|2.0e+00|4.6e-10| ↙
chol 1  1
24|1.000|1.000|2.2e-10|5.7e-07|1.3e-04|-3.987261e+00| 0:0:00|7.3e-07|1.9e+00|1.9e-10| ↙
chol 1  1
25|1.000|1.000|1.2e-09|2.3e-07|2.8e-05|-3.987306e+00| 0:0:00|3.0e-07|2.0e+00|4.2e-11| ↙
chol 1  1
26|1.000|1.000|9.5e-09|2.3e-07|6.6e-06|-3.987316e+00| 0:0:00|6.6e-08|2.0e+00|9.1e-12| ↙
chol 1  1
27|1.000|1.000|1.4e-08|2.3e-07|1.1e-06|-3.987318e+00| 0:0:00|1.6e-08|2.0e+00|3.3e-13| ↙
chol 1  1
28|1.000|1.000|2.6e-08|2.3e-07|1.2e-07|-3.987319e+00| 0:0:00|2.6e-09|2.0e+00|0.0e+00| ↙
chol 1  1
29|1.000|1.000|3.2e-08|2.3e-07|3.8e-09|-3.987319e+00| 0:0:00|3.0e-10|2.0e+00|0.0e+00|
  Stop: relative gap < infeasibility
-----------------------------------------------------------------
 number of iterations   = 29
 primal objective value = -3.98731844e+00
 dual   objective value = -3.98731757e+00
 gap := trace(XZ)       = 1.08e-06
 relative gap           = 2.16e-07
 actual relative gap    = -9.73e-08
 rel. primal infeas     = 1.41e-08
 rel. dual   infeas     = 2.26e-07
 norm(X), norm(y), norm(Z) = 5.3e+01, 4.4e+01, 2.5e+01
 norm(A), norm(b), norm(C) = 7.9e+02, 2.5e+00, 2.8e+01
 Total CPU time (secs)  = 0.22
 CPU time per iteration = 0.01
 termination code       = -1
 DIMACS errors: 1.4e-08  0.0e+00  2.3e-07  0.0e+00  -9.7e-08  1.2e-07
```

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

ans =

    3.9873

Iteration   6   Total error is: 0.0077944

 num. of constraints = 25
 dim. of socp   var  = 26,   num. of socp blk  =  1
 dim. of linear var  = 800
 2 linear variables from unrestricted variable.

 *** convert ublk to linear blk
********************************************************************************* ↙
******
   SDPT3: homogeneous self-dual path-following algorithms
********************************************************************************* ↙
******
 version  predcorr  gam  expon
   HKM      1      0.000   1
it pstep dstep pinfeas dinfeas  gap     mean(obj)    cputime    kap   tau    theta
------------------------------------------------------------------------------------ ↙
------
 0|0.000|0.000|2.8e+00|5.1e+01|1.3e+06| 1.126177e+04| 0:0:00|1.3e+06|1.0e+00|1.0e+00| ↙
chol 1  1
 1|0.877|0.877|3.5e-01|6.2e+00|1.7e+05| 1.031098e+04| 0:0:00|1.2e+05|1.0e+00|1.3e-01| ↙
chol 1  1
 2|0.732|0.732|4.3e-01|7.7e+00|4.6e+05| 2.175731e+04| 0:0:00|8.0e+04|6.3e-01|9.6e-02| ↙
chol 1  1
 3|1.000|1.000|3.1e-01|5.5e+00|4.7e+05| 2.821720e+04| 0:0:00|1.7e+04|5.0e-01|5.5e-02| ↙
chol 1  1
 4|0.595|0.595|1.4e-01|2.5e+00|1.5e+05| 1.514063e+04| 0:0:00|8.0e+02|6.8e-01|3.4e-02| ↙
chol 1  1
 5|0.754|0.754|4.6e-02|8.2e-01|3.9e+04| 6.959965e+03| 0:0:00|3.5e+01|9.0e-01|1.5e-02| ↙
chol 1  1
 6|0.979|0.979|3.4e-03|6.0e-02|2.3e+03| 5.976313e+02| 0:0:00|3.0e+01|1.2e+00|1.5e-03| ↙
chol 1  1
 7|0.952|0.952|2.5e-03|4.4e-02|1.8e+03| 5.180842e+02| 0:0:00|5.5e+00|1.2e+00|1.0e-03| ↙
chol 1  1
 8|1.000|1.000|1.2e-03|2.2e-02|8.9e+02| 2.412991e+02| 0:0:00|2.6e+00|1.2e+00|5.2e-04| ↙
chol 1  1
 9|1.000|1.000|6.3e-04|1.1e-02|4.6e+02| 1.251740e+02| 0:0:00|1.3e+00|1.2e+00|2.7e-04| ↙
chol 1  1
10|1.000|1.000|2.4e-04|4.4e-03|1.7e+02| 4.348991e+01| 0:0:00|6.5e-01|1.3e+00|1.1e-04| ↙
chol 1  1
11|1.000|1.000|1.0e-04|2.0e-03|7.2e+01| 1.661245e+01| 0:0:00|2.5e-01|1.3e+00|4.8e-05| ↙
chol 1  1
12|1.000|1.000|3.6e-05|7.5e-04|2.4e+01| 2.941458e+00| 0:0:00|1.0e-01|1.3e+00|1.7e-05| ↙
chol 1  1
13|1.000|1.000|1.5e-05|3.8e-04|9.5e+00|-1.118202e+00| 0:0:00|3.5e-02|1.4e+00|7.4e-06| ↙
chol 1  1
14|1.000|1.000|4.8e-06|2.4e-04|2.8e+00|-3.093951e+00| 0:0:00|1.4e-02|1.5e+00|2.6e-06| ↙
chol 1  1
15|1.000|1.000|1.9e-06|2.0e-04|1.0e+00|-3.598077e+00| 0:0:00|3.9e-03|1.7e+00|1.1e-06| ↙
```

```
chol 1  1
16|1.000|1.000|5.3e-07|1.7e-04|2.6e-01|-3.851872e+00| 0:0:00|1.8e-03|1.8e+00|3.4e-07| ↙
chol 1  1
17|1.000|1.000|1.7e-07|1.5e-04|8.0e-02|-3.910140e+00| 0:0:00|5.0e-04|1.9e+00|1.1e-07| ↙
chol 1  1
18|0.884|0.884|3.5e-08|1.4e-04|1.6e-02|-3.932297e+00| 0:0:00|2.1e-04|1.9e+00|2.4e-08| ↙
chol 1  1
19|0.869|0.869|2.0e-08|6.6e-05|9.1e-03|-3.934604e+00| 0:0:00|6.0e-05|1.9e+00|1.4e-08| ↙
chol 1  1
20|0.888|0.888|4.4e-09|2.7e-05|1.7e-03|-3.937438e+00| 0:0:00|2.6e-05|2.0e+00|2.6e-09| ↙
chol 1  1
21|0.697|0.697|2.8e-09|1.4e-05|1.2e-03|-3.937611e+00| 0:0:00|1.1e-05|2.0e+00|1.8e-09| ↙
chol 1  1
22|1.000|1.000|4.5e-10|3.5e-06|1.6e-04|-3.938020e+00| 0:0:00|2.8e-06|2.0e+00|2.5e-10| ↙
chol 1  1
23|1.000|1.000|9.3e-10|1.4e-06|3.9e-05|-3.938069e+00| 0:0:00|3.9e-07|2.0e+00|5.9e-11| ↙
chol 1  1
24|1.000|1.000|5.0e-09|1.4e-06|6.5e-06|-3.938082e+00| 0:0:00|9.2e-08|2.0e+00|9.3e-12| ↙
chol 1  1
25|1.000|1.000|4.4e-09|1.4e-06|2.5e-07|-3.938084e+00| 0:0:00|1.5e-08|2.0e+00|0.0e+00| ↙
chol 1  1
26|1.000|1.000|6.0e-09|1.4e-06|3.1e-09|-3.938084e+00| 0:0:00|6.0e-10|2.0e+00|0.0e+00|
  Stop: relative gap < infeasibility
-----------------------------------------------------------------
 number of iterations   = 26
 primal objective value = -3.93808077e+00
 dual   objective value = -3.93808295e+00
 gap := trace(XZ)       = 6.47e-06
 relative gap           = 1.31e-06
 actual relative gap    = 2.46e-07
 rel. primal infeas     = 5.02e-09
 rel. dual   infeas     = 1.41e-06
 norm(X), norm(y), norm(Z) = 2.6e+01, 4.3e+01, 2.5e+01
 norm(A), norm(b), norm(C) = 7.9e+02, 2.5e+00, 2.8e+01
 Total CPU time (secs)  = 0.25
 CPU time per iteration = 0.01
 termination code       = -1
 DIMACS errors: 5.0e-09  0.0e+00  1.4e-06  0.0e+00  2.5e-07  7.3e-07
-----------------------------------------------------------------

ans =

    3.9381

Iteration   7   Total error is: 0.0077435

 num. of constraints = 25
 dim. of socp   var  = 26,   num. of socp blk  =  1
 dim. of linear var  = 800
 2 linear variables from unrestricted variable.

 *** convert ublk to linear blk
********************************************************************************* ↙
******
   SDPT3: homogeneous self-dual path-following algorithms
```

```
********************************************************************************* ↙
******
 version  predcorr  gam  expon
   HKM      1      0.000   1
it pstep dstep pinfeas dinfeas  gap     mean(obj)    cputime    kap   tau    theta
------------------------------------------------------------------------------------ ↙
------
 0|0.000|0.000|2.8e+00|5.1e+01|1.3e+06| 1.157037e+04| 0:0:00|1.3e+06|1.0e+00|1.0e+00| ↙
chol 1  1
 1|0.877|0.877|3.4e-01|6.2e+00|1.7e+05| 1.059430e+04| 0:0:00|1.3e+05|1.0e+00|1.3e-01| ↙
chol 1  1
 2|0.769|0.769|4.3e-01|7.8e+00|5.0e+05| 2.325724e+04| 0:0:00|8.0e+04|6.1e-01|9.5e-02| ↙
chol 1  1
 3|1.000|1.000|2.9e-01|5.3e+00|4.7e+05| 2.880597e+04| 0:0:00|1.5e+04|5.0e-01|5.3e-02| ↙
chol 1  1
 4|0.601|0.601|1.3e-01|2.4e+00|1.5e+05| 1.559584e+04| 0:0:00|7.3e+02|6.8e-01|3.3e-02| ↙
chol 1  1
 5|0.755|0.755|4.3e-02|7.9e-01|3.8e+04| 6.934972e+03| 0:0:00|3.1e+01|9.1e-01|1.4e-02| ↙
chol 1  1
 6|0.957|0.957|3.7e-03|6.8e-02|2.7e+03| 6.739748e+02| 0:0:00|3.1e+01|1.2e+00|1.7e-03| ↙
chol 1  1
 7|1.000|1.000|2.6e-03|4.7e-02|2.0e+03| 5.742909e+02| 0:0:00|4.8e+00|1.2e+00|1.1e-03| ↙
chol 1  1
 8|1.000|1.000|1.2e-03|2.2e-02|9.2e+02| 2.526973e+02| 0:0:00|2.8e+00|1.2e+00|5.3e-04| ↙
chol 1  1
 9|1.000|1.000|5.8e-04|1.1e-02|4.4e+02| 1.211910e+02| 0:0:00|1.3e+00|1.2e+00|2.6e-04| ↙
chol 1  1
10|1.000|1.000|2.3e-04|4.3e-03|1.7e+02| 4.458572e+01| 0:0:00|6.3e-01|1.3e+00|1.1e-04| ↙
chol 1  1
11|1.000|1.000|9.8e-05|1.9e-03|7.1e+01| 1.647762e+01| 0:0:00|2.5e-01|1.3e+00|4.6e-05| ↙
chol 1  1
12|1.000|1.000|3.5e-05|7.3e-04|2.5e+01| 3.081998e+00| 0:0:00|1.0e-01|1.3e+00|1.7e-05| ↙
chol 1  1
13|1.000|1.000|1.4e-05|3.8e-04|9.5e+00|-1.060395e+00| 0:0:00|3.5e-02|1.4e+00|7.2e-06| ↙
chol 1  1
14|1.000|1.000|4.6e-06|2.4e-04|2.8e+00|-3.026439e+00| 0:0:00|1.4e-02|1.5e+00|2.5e-06| ↙
chol 1  1
15|1.000|1.000|1.8e-06|2.0e-04|1.0e+00|-3.534731e+00| 0:0:00|3.9e-03|1.7e+00|1.1e-06| ↙
chol 1  1
16|1.000|1.000|5.1e-07|1.7e-04|2.6e-01|-3.787099e+00| 0:0:00|1.8e-03|1.8e+00|3.3e-07| ↙
chol 1  1
17|1.000|1.000|1.7e-07|1.5e-04|8.5e-02|-3.844114e+00| 0:0:00|5.0e-04|1.9e+00|1.2e-07| ↙
chol 1  1
18|0.984|0.984|2.7e-08|1.4e-04|1.3e-02|-3.868976e+00| 0:0:00|1.9e-04|2.0e+00|1.9e-08| ↙
chol 1  1
19|1.000|1.000|1.3e-08|5.5e-05|6.1e-03|-3.871297e+00| 0:0:00|3.1e-05|2.0e+00|8.9e-09| ↙
chol 1  1
20|0.961|0.961|2.7e-09|2.3e-05|1.2e-03|-3.873152e+00| 0:0:00|1.5e-05|2.0e+00|1.8e-09| ↙
chol 1  1
21|0.647|0.647|1.7e-09|1.4e-05|8.2e-04|-3.873300e+00| 0:0:00|7.2e-06|2.0e+00|1.2e-09| ↙
chol 1  1
22|0.832|0.832|8.2e-10|5.3e-06|4.0e-04|-3.873459e+00| 0:0:00|2.8e-06|2.0e+00|5.8e-10| ↙
chol 1  1
23|0.799|0.799|3.8e-10|2.2e-06|2.3e-04|-3.873528e+00| 0:0:00|1.3e-06|2.0e+00|3.4e-10| ↙
chol 1  1
```

```
24|0.977|0.977|3.7e-10|6.0e-07|2.9e-05|-3.873616e+00| 0:0:00|5.7e-07|2.0e+00|4.4e-11| ↙
chol 1  1
25|1.000|1.000|7.2e-09|5.7e-07|1.1e-05|-3.873624e+00| 0:0:00|6.9e-08|2.0e+00|1.6e-11| ↙
chol 1  1
26|1.000|1.000|4.5e-09|5.7e-07|1.4e-06|-3.873628e+00| 0:0:00|2.6e-08|2.0e+00|1.7e-12| ↙
chol 1  1
27|1.000|1.000|8.5e-09|5.7e-07|5.9e-08|-3.873628e+00| 0:0:00|3.4e-09|2.0e+00|0.0e+00|
  Stop: relative gap < infeasibility
-----------------------------------------------------------------
 number of iterations   = 27
 primal objective value = -3.87362784e+00
 dual   objective value = -3.87362745e+00
 gap := trace(XZ)       = 1.42e-06
 relative gap           = 2.91e-07
 actual relative gap    = -4.48e-08
 rel. primal infeas     = 4.55e-09
 rel. dual   infeas     = 5.65e-07
 norm(X), norm(y), norm(Z) = 2.9e+01, 4.3e+01, 2.5e+01
 norm(A), norm(b), norm(C) = 7.9e+02, 2.4e+00, 2.8e+01
 Total CPU time (secs)  = 0.20
 CPU time per iteration = 0.01
 termination code       = -1
 DIMACS errors: 4.5e-09  0.0e+00  5.7e-07  0.0e+00  -4.5e-08  1.6e-07
-----------------------------------------------------------------

ans =

    3.8736

Iteration   8   Total error is: 0.0076754
The total representation error of the testing signals is: 0.26068
>>
```