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

 num. of constraints = 65
 dim. of socp   var  = 66,   num. of socp blk  =  1
 dim. of linear var  = 800
*******************************************************************
   SDPT3: Infeasible path-following algorithms
*******************************************************************
 version  predcorr  gam  expon  scale_data
   HKM      1      0.000   1        0
it pstep dstep pinfeas dinfeas  gap      prim-obj      dual-obj    cputime
-------------------------------------------------------------------
 0|0.000|0.000|1.0e+00|3.5e+01|5.9e+06| 2.997384e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.998|2.1e-07|1.9e-01|6.3e+04| 3.086335e+04 -2.152907e+01| 0:0:00| chol  1↙
1
 2|1.000|1.000|5.0e-08|3.3e-02|7.4e+03| 6.283172e+03 -1.464232e+01| 0:0:00| chol  1↙
1
 3|0.999|0.998|1.0e-08|3.4e-03|1.6e+02| 1.418049e+02 -1.490592e+01| 0:0:00| chol  1↙
1
 4|0.543|0.651|1.3e-07|1.4e-03|1.3e+02| 1.139315e+02 -1.420884e+01| 0:0:00| chol  1↙
1
 5|0.759|1.000|3.2e-08|3.3e-05|9.4e+01| 7.999336e+01 -1.392916e+01| 0:0:00| chol  1↙
1
 6|1.000|1.000|1.4e-10|3.3e-06|5.1e+01| 3.701571e+01 -1.363776e+01| 0:0:00| chol  1↙
1
 7|1.000|1.000|6.6e-11|3.3e-07|1.9e+01| 5.726597e+00 -1.350322e+01| 0:0:00| chol  1↙
1
 8|1.000|1.000|2.5e-11|3.3e-08|8.2e+00|-5.206812e+00 -1.339794e+01| 0:0:00| chol  1↙
1
 9|1.000|1.000|8.9e-12|3.3e-09|1.2e+00|-1.214422e+01 -1.336580e+01| 0:0:00| chol  1↙
2
10|1.000|1.000|2.0e-13|3.3e-10|2.5e-01|-1.311472e+01 -1.336053e+01| 0:0:00| chol  2↙
2
11|0.972|0.973|6.5e-13|4.2e-11|7.2e-03|-1.335288e+01 -1.336010e+01| 0:0:00| chol  2↙
2
12|0.976|0.991|1.3e-12|4.7e-12|1.7e-04|-1.335992e+01 -1.336009e+01| 0:0:00| chol  3↙
3
13|0.982|1.000|3.5e-11|1.0e-12|1.8e-05|-1.336008e+01 -1.336009e+01| 0:0:00| chol  5↙
5
14|1.000|1.000|2.6e-10|1.5e-12|2.4e-06|-1.336009e+01 -1.336009e+01| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-------------------------------------------------------------------
 number of iterations   = 14
 primal objective value = -1.33600905e+01
 dual   objective value = -1.33600928e+01
 gap := trace(XZ)       = 2.36e-06
 relative gap           = 8.52e-08
 actual relative gap    = 8.36e-08
 rel. primal infeas     = 2.63e-10
 rel. dual   infeas     = 1.50e-12
 norm(X), norm(y), norm(Z) = 2.8e+01, 9.0e+01, 5.7e+01
```

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 norm(A), norm(b), norm(C) = 4.2e+02, 4.3e+02, 7.7e+01
 Total CPU time (secs)  = 0.49
 CPU time per iteration = 0.03
 termination code       =  0
 DIMACS errors: 8.3e-10  0.0e+00  2.1e-12  0.0e+00  8.4e-08  8.5e-08
------------------------------------------------------------------

ans =

   13.3601


 num. of constraints = 65
 dim. of socp   var  = 66,   num. of socp blk  =  1
 dim. of linear var  = 800
*******************************************************************
   SDPT3: Infeasible path-following algorithms
*******************************************************************
 version  predcorr  gam  expon  scale_data
   HKM      1      0.000   1        0
it pstep dstep pinfeas dinfeas  gap      prim-obj      dual-obj    cputime
-------------------------------------------------------------------
 0|0.000|0.000|1.0e+00|3.5e+01|9.9e+06| 5.076538e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.997|1.9e-07|2.0e-01|1.1e+05| 5.163992e+04 -2.652020e+01| 0:0:00| chol  1↙
1
 2|1.000|1.000|3.6e-08|3.3e-02|1.3e+04| 1.109740e+04 -1.205468e+01| 0:0:00| chol  1↙
1
 3|0.988|0.982|7.4e-09|1.0e-02|2.9e+02| 2.626010e+02 -1.156746e+01| 0:0:00| chol  1↙
1
 4|0.434|0.686|4.7e-08|3.9e-03|2.5e+02| 2.340635e+02 -9.491848e+00| 0:0:00| chol  1↙
1
 5|0.482|1.000|2.5e-08|1.0e-04|2.1e+02| 2.003962e+02 -9.688244e+00| 0:0:00| chol  1↙
1
 6|1.000|1.000|1.4e-10|1.0e-05|1.3e+02| 1.221614e+02 -8.224646e+00| 0:0:00| chol  1↙
1
 7|0.909|1.000|6.1e-11|1.0e-06|4.7e+01| 3.906929e+01 -7.509622e+00| 0:0:00| chol  1↙
1
 8|1.000|1.000|3.8e-11|1.0e-07|2.6e+01| 1.914710e+01 -7.094378e+00| 0:0:00| chol  1↙
1
 9|1.000|1.000|9.5e-12|1.0e-08|7.7e+00| 7.637508e-01 -6.902895e+00| 0:0:00| chol  1↙
1
10|1.000|1.000|2.0e-14|1.0e-09|3.3e+00|-3.453657e+00 -6.794262e+00| 0:0:00| chol  1↙
1
11|0.954|1.000|1.5e-12|1.0e-10|8.2e-01|-5.940444e+00 -6.760703e+00| 0:0:00| chol  1↙
1
12|1.000|1.000|1.3e-11|1.1e-11|3.9e-01|-6.360595e+00 -6.753642e+00| 0:0:00| chol  1↙
1
13|0.961|1.000|2.0e-11|2.5e-12|5.0e-02|-6.700275e+00 -6.750523e+00| 0:0:00| chol  2↙
2
14|0.964|1.000|1.7e-12|2.3e-12|5.7e-03|-6.744696e+00 -6.750362e+00| 0:0:00| chol  2↙
2
15|0.973|0.983|4.3e-11|1.0e-12|2.6e-04|-6.750091e+00 -6.750351e+00| 0:0:00| chol  3↙
3
```

```
16|1.000|1.000|1.4e-11|1.5e-12|8.1e-06|-6.750342e+00 -6.750350e+00| 0:0:00| chol  5↙
5
17|1.000|1.000|3.4e-11|2.3e-12|1.0e-07|-6.750350e+00 -6.750350e+00| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-------------------------------------------------------------------
 number of iterations   = 17
 primal objective value = -6.75035034e+00
 dual   objective value = -6.75035044e+00
 gap := trace(XZ)       = 1.01e-07
 relative gap           = 6.95e-09
 actual relative gap    = 6.89e-09
 rel. primal infeas     = 3.40e-11
 rel. dual   infeas     = 2.25e-12
 norm(X), norm(y), norm(Z) = 3.2e+01, 9.6e+01, 6.7e+01
 norm(A), norm(b), norm(C) = 4.4e+02, 6.4e+02, 7.7e+01
 Total CPU time (secs)  = 0.16
 CPU time per iteration = 0.01
 termination code       =  0
 DIMACS errors: 7.4e-11  0.0e+00  3.2e-12  0.0e+00  6.9e-09  7.0e-09
-------------------------------------------------------------------

ans =

    6.7504

Iteration   2   Total error is: 0.010574

 num. of constraints = 65
 dim. of socp   var  = 66,   num. of socp blk  =  1
 dim. of linear var  = 800
*******************************************************************
   SDPT3: Infeasible path-following algorithms
*******************************************************************
 version  predcorr  gam  expon  scale_data
   HKM      1      0.000   1        0
it pstep dstep pinfeas dinfeas  gap      prim-obj      dual-obj    cputime
-------------------------------------------------------------------
 0|0.000|0.000|1.0e+00|3.5e+01|8.2e+06| 4.154641e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.997|2.6e-07|2.1e-01|9.1e+04| 4.231931e+04 -2.287971e+01| 0:0:00| chol  1↙
1
 2|1.000|1.000|7.5e-08|3.3e-02|1.2e+04| 1.039207e+04 -1.375499e+01| 0:0:00| chol  1↙
1
 3|0.988|0.980|1.4e-08|1.0e-02|2.7e+02| 2.451877e+02 -1.306875e+01| 0:0:00| chol  1↙
1
 4|0.382|0.587|6.4e-08|4.9e-03|2.4e+02| 2.221855e+02 -1.018967e+01| 0:0:00| chol  1↙
1
 5|0.324|1.000|4.3e-08|1.0e-04|2.1e+02| 2.040604e+02 -1.032818e+01| 0:0:00| chol  1↙
1
 6|1.000|1.000|9.3e-11|1.0e-05|1.4e+02| 1.320793e+02 -7.780091e+00| 0:0:00| chol  1↙
1
 7|0.889|1.000|2.8e-11|1.0e-06|6.2e+01| 5.494654e+01 -6.615924e+00| 0:0:00| chol  1↙
1
 8|1.000|1.000|9.2e-12|1.0e-07|3.4e+01| 2.896662e+01 -5.467403e+00| 0:0:00| chol  1↙
```

```
1
 9|1.000|1.000|3.3e-12|1.0e-08|1.4e+01| 8.811697e+00 -5.172585e+00| 0:0:00| chol  1↙
1
10|1.000|1.000|1.7e-13|1.0e-09|5.9e+00| 1.098788e+00 -4.767015e+00| 0:0:00| chol  1↙
1
11|1.000|1.000|2.4e-13|1.0e-10|1.3e+00|-3.418061e+00 -4.671148e+00| 0:0:00| chol  1↙
1
12|1.000|1.000|7.3e-12|1.1e-11|4.4e-01|-4.201998e+00 -4.645711e+00| 0:0:00| chol  1↙
1
13|0.954|0.962|4.2e-11|2.8e-12|3.0e-02|-4.609753e+00 -4.639675e+00| 0:0:00| chol  2↙
2
14|0.925|0.954|3.5e-12|2.4e-12|2.7e-03|-4.636756e+00 -4.639423e+00| 0:0:00| chol  2↙
2
15|0.956|0.997|1.8e-11|1.0e-12|3.0e-04|-4.639111e+00 -4.639407e+00| 0:0:00| chol  2↙
3
16|1.000|1.000|2.0e-11|1.5e-12|9.7e-06|-4.639396e+00 -4.639406e+00| 0:0:00| chol  4↙
4
17|1.000|1.000|1.8e-11|2.3e-12|1.6e-07|-4.639405e+00 -4.639406e+00| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-------------------------------------------------------------------
 number of iterations   = 17
 primal objective value = -4.63940543e+00
 dual   objective value = -4.63940560e+00
 gap := trace(XZ)       = 1.62e-07
 relative gap           = 1.58e-08
 actual relative gap    = 1.57e-08
 rel. primal infeas     = 1.81e-11
 rel. dual   infeas     = 2.25e-12
 norm(X), norm(y), norm(Z) = 3.4e+01, 9.8e+01, 6.9e+01
 norm(A), norm(b), norm(C) = 4.4e+02, 4.9e+02, 7.7e+01
 Total CPU time (secs)  = 0.14
 CPU time per iteration = 0.01
 termination code       =  0
 DIMACS errors: 5.0e-11  0.0e+00  3.2e-12  0.0e+00  1.6e-08  1.6e-08
-------------------------------------------------------------------

ans =

    4.6394

Iteration   3   Total error is: 0.0087495

 num. of constraints = 65
 dim. of socp   var  = 66,   num. of socp blk  =  1
 dim. of linear var  = 800
*******************************************************************
   SDPT3: Infeasible path-following algorithms
*******************************************************************
 version  predcorr  gam  expon  scale_data
   HKM      1      0.000   1        0
it pstep dstep pinfeas dinfeas  gap      prim-obj      dual-obj    cputime
-------------------------------------------------------------------
 0|0.000|0.000|1.0e+00|3.5e+01|8.0e+06| 4.090737e+04  0.000000e+00| 0:0:00| chol  1↙
1
```

```
 1|1.000|0.997|2.4e-07|2.2e-01|9.0e+04| 4.167232e+04 -2.398110e+01| 0:0:00| chol  1↙
1
 2|1.000|1.000|6.8e-08|3.3e-02|1.2e+04| 1.035715e+04 -1.470397e+01| 0:0:00| chol  1↙
1
 3|0.986|0.978|1.3e-08|1.0e-02|3.0e+02| 2.697670e+02 -1.397105e+01| 0:0:00| chol  1↙
1
 4|0.349|0.631|6.0e-08|4.5e-03|2.7e+02| 2.483728e+02 -9.999848e+00| 0:0:00| chol  1↙
1
 5|0.313|1.000|4.1e-08|1.0e-04|2.4e+02| 2.295980e+02 -1.068653e+01| 0:0:00| chol  1↙
1
 6|1.000|1.000|8.1e-11|1.0e-05|1.4e+02| 1.356394e+02 -6.637903e+00| 0:0:00| chol  1↙
1
 7|0.822|1.000|3.3e-11|1.0e-06|7.9e+01| 7.362034e+01 -5.794157e+00| 0:0:00| chol  1↙
1
 8|1.000|1.000|6.1e-12|1.0e-07|4.1e+01| 3.758137e+01 -3.789149e+00| 0:0:00| chol  1↙
1
 9|1.000|1.000|3.7e-12|1.0e-08|1.9e+01| 1.607060e+01 -3.415357e+00| 0:0:00| chol  1↙
1
10|1.000|1.000|1.1e-13|1.0e-09|8.2e+00| 5.576825e+00 -2.619862e+00| 0:0:00| chol  1↙
1
11|1.000|1.000|4.5e-14|1.0e-10|2.6e+00| 1.373247e-01 -2.453626e+00| 0:0:00| chol  1↙
1
12|1.000|1.000|6.3e-12|1.1e-11|9.5e-01|-1.410323e+00 -2.357798e+00| 0:0:00| chol  1↙
1
13|0.947|0.862|6.7e-12|3.6e-12|1.3e-01|-2.211623e+00 -2.337688e+00| 0:0:00| chol  2↙
2
14|1.000|0.981|1.1e-13|1.5e-12|2.2e-02|-2.311834e+00 -2.333883e+00| 0:0:00| chol  2↙
1
15|0.979|0.978|1.7e-11|1.0e-12|4.8e-04|-2.333137e+00 -2.333612e+00| 0:0:00| chol  2↙
2
16|0.987|0.990|3.9e-12|1.5e-12|1.9e-05|-2.333586e+00 -2.333605e+00| 0:0:00| chol  3↙
3
17|0.980|1.000|6.9e-12|1.0e-12|1.5e-06|-2.333603e+00 -2.333605e+00| 0:0:00| chol  8↙
8
18|1.000|1.000|1.9e-10|1.4e-12|1.4e-07|-2.333604e+00 -2.333605e+00| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
------------------------------------------------------------------
 number of iterations   = 18
 primal objective value = -2.33360443e+00
 dual   objective value = -2.33360458e+00
 gap := trace(XZ)       = 1.44e-07
 relative gap           = 2.54e-08
 actual relative gap    = 2.66e-08
 rel. primal infeas     = 1.95e-10
 rel. dual   infeas     = 1.38e-12
 norm(X), norm(y), norm(Z) = 3.4e+01, 9.9e+01, 7.0e+01
 norm(A), norm(b), norm(C) = 4.4e+02, 5.1e+02, 7.7e+01
 Total CPU time (secs)  = 0.13
 CPU time per iteration = 0.01
 termination code       =  0
 DIMACS errors: 4.7e-10  0.0e+00  2.0e-12  0.0e+00  2.7e-08  2.5e-08
------------------------------------------------------------------

ans =
```

```
    2.3336

Iteration   4   Total error is: 0.0061638

 num. of constraints = 65
 dim. of socp   var  = 66,   num. of socp blk  =  1
 dim. of linear var  = 800
*******************************************************************
   SDPT3: Infeasible path-following algorithms
*******************************************************************
 version  predcorr  gam  expon  scale_data
   HKM      1      0.000   1        0
it pstep dstep pinfeas dinfeas  gap      prim-obj      dual-obj    cputime
-------------------------------------------------------------------
 0|0.000|0.000|1.0e+00|3.5e+01|8.0e+06| 4.073492e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.994|2.2e-07|3.0e-01|1.1e+05| 4.149764e+04 -2.042379e+01| 0:0:00| chol  1↙
1
 2|1.000|1.000|7.2e-08|3.3e-02|1.8e+04| 1.548179e+04 -1.881862e+01| 0:0:00| chol  1↙
1
 3|0.990|0.986|9.7e-09|1.0e-02|3.6e+02| 3.251168e+02 -1.629305e+01| 0:0:00| chol  1↙
1
 4|0.444|0.466|6.3e-08|6.0e-03|3.1e+02| 2.880090e+02 -1.194070e+01| 0:0:00| chol  1↙
1
 5|0.334|1.000|4.2e-08|1.0e-04|2.7e+02| 2.652981e+02 -8.825748e+00| 0:0:00| chol  1↙
1
 6|1.000|1.000|1.1e-10|1.0e-05|2.1e+02| 1.989595e+02 -8.463550e+00| 0:0:00| chol  1↙
1
 7|1.000|1.000|1.5e-11|1.0e-06|9.5e+01| 8.934406e+01 -5.273323e+00| 0:0:00| chol  1↙
1
 8|1.000|1.000|8.2e-12|1.0e-07|4.2e+01| 3.895369e+01 -2.729853e+00| 0:0:00| chol  1↙
1
 9|1.000|1.000|4.3e-12|1.0e-08|2.2e+01| 1.960356e+01 -2.084957e+00| 0:0:00| chol  1↙
1
10|1.000|1.000|2.0e-14|1.0e-09|7.8e+00| 6.530663e+00 -1.235167e+00| 0:0:00| chol  1↙
1
11|1.000|1.000|2.4e-13|1.0e-10|2.6e+00| 1.570691e+00 -1.020605e+00| 0:0:00| chol  1↙
1
12|1.000|1.000|1.1e-12|1.1e-11|6.6e-01|-2.579684e-01 -9.213059e-01| 0:0:00| chol  1↙
1
13|0.921|0.932|1.5e-12|2.7e-12|1.2e-01|-7.907697e-01 -9.079180e-01| 0:0:00| chol  1↙
2
14|1.000|0.984|3.1e-13|1.1e-12|2.3e-02|-8.824437e-01 -9.059023e-01| 0:0:00| chol  2↙
2
15|0.945|0.943|1.8e-12|1.1e-12|2.9e-03|-9.027637e-01 -9.056468e-01| 0:0:00| chol  2↙
2
16|1.000|1.000|6.9e-12|1.0e-12|6.4e-04|-9.049887e-01 -9.056257e-01| 0:0:00| chol  3↙
3
17|1.000|1.000|3.1e-11|1.4e-12|2.3e-04|-9.053962e-01 -9.056231e-01| 0:0:00| chol  3↙
3
18|1.000|1.000|1.6e-11|2.1e-12|3.2e-05|-9.055900e-01 -9.056219e-01| 0:0:00| chol  4↙
4
19|1.000|1.000|3.2e-11|3.1e-12|2.9e-06|-9.056189e-01 -9.056218e-01| 0:0:00| chol  6↙
```

```
5
20|1.000|1.000|5.0e-11|4.6e-12|5.1e-08|-9.056217e-01 -9.056217e-01| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-------------------------------------------------------------------
 number of iterations   = 20
 primal objective value = -9.05621693e-01
 dual   objective value = -9.05621745e-01
 gap := trace(XZ)       = 5.05e-08
 relative gap           = 1.80e-08
 actual relative gap    = 1.83e-08
 rel. primal infeas     = 5.01e-11
 rel. dual   infeas     = 4.65e-12
 norm(X), norm(y), norm(Z) = 3.5e+01, 1.0e+02, 7.2e+01
 norm(A), norm(b), norm(C) = 4.6e+02, 5.6e+02, 7.7e+01
 Total CPU time (secs)  = 0.16
 CPU time per iteration = 0.01
 termination code       =  0
 DIMACS errors: 1.1e-10  0.0e+00  6.7e-12  0.0e+00  1.8e-08  1.8e-08
-------------------------------------------------------------------

ans =

    0.9056

Iteration   5   Total error is: 0.0037638

 num. of constraints = 65
 dim. of socp   var  = 66,   num. of socp blk  =  1
 dim. of linear var  = 800
*******************************************************************
   SDPT3: Infeasible path-following algorithms
*******************************************************************
 version  predcorr  gam  expon  scale_data
   HKM      1      0.000   1        0
it pstep dstep pinfeas dinfeas  gap      prim-obj      dual-obj    cputime
-------------------------------------------------------------------
 0|0.000|0.000|1.0e+00|3.5e+01|8.1e+06| 4.142945e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.993|2.1e-07|3.6e-01|1.2e+05| 4.217442e+04 -1.845061e+01| 0:0:00| chol  1↙
1
 2|1.000|1.000|7.4e-08|3.3e-02|2.2e+04| 1.857811e+04 -2.173184e+01| 0:0:00| chol  1↙
1
 3|0.991|0.987|9.4e-09|1.0e-02|4.2e+02| 3.759290e+02 -1.766790e+01| 0:0:00| chol  1↙
1
 4|0.485|0.441|6.0e-08|6.2e-03|3.5e+02| 3.230836e+02 -1.315591e+01| 0:0:00| chol  1↙
1
 5|0.446|0.939|3.4e-08|4.7e-04|3.0e+02| 2.896948e+02 -8.667884e+00| 0:0:00| chol  1↙
1
 6|0.423|1.000|1.9e-08|1.0e-05|2.8e+02| 2.629772e+02 -1.280210e+01| 0:0:00| chol  1↙
1
 7|1.000|1.000|4.0e-11|1.0e-06|1.9e+02| 1.821511e+02 -7.646150e+00| 0:0:00| chol  1↙
1
 8|0.802|0.870|1.1e-11|2.2e-07|6.7e+01| 6.351851e+01 -3.827146e+00| 0:0:00| chol  1↙
1
```

```
 9|1.000|1.000|1.7e-11|1.0e-08|4.5e+01| 4.258112e+01 -2.218660e+00| 0:0:00| chol  1↙
1
10|0.904|1.000|1.6e-12|1.0e-09|1.6e+01| 1.462299e+01 -1.795184e+00| 0:0:00| chol  1↙
1
11|1.000|1.000|6.6e-14|1.0e-10|7.1e+00| 6.360099e+00 -7.265405e-01| 0:0:00| chol  1↙
1
12|1.000|1.000|7.0e-14|1.1e-11|1.8e+00| 1.288561e+00 -5.421178e-01| 0:0:00| chol  1↙
1
13|1.000|1.000|3.7e-12|2.0e-12|7.3e-01| 2.578989e-01 -4.735056e-01| 0:0:00| chol  1↙
1
14|0.948|0.864|8.7e-12|1.4e-12|8.5e-02|-3.710982e-01 -4.559420e-01| 0:0:00| chol  2↙
2
15|1.000|0.971|3.7e-13|1.5e-12|2.0e-02|-4.331684e-01 -4.531989e-01| 0:0:00| chol  2↙
2
16|0.956|0.945|2.9e-12|1.1e-12|1.1e-03|-4.518785e-01 -4.529560e-01| 0:0:00| chol  3↙
3
17|0.935|0.933|1.9e-11|1.1e-12|9.4e-05|-4.528498e-01 -4.529439e-01| 0:0:00| chol  4↙
4
18|1.000|1.000|1.2e-10|1.5e-12|1.2e-05|-4.529307e-01 -4.529431e-01| 0:0:00| chol  5↙
5
19|1.000|1.000|1.0e-10|2.3e-12|2.4e-07|-4.529428e-01 -4.529431e-01| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30 ^ 3
20|0.994|0.806|6.7e-10|3.8e-12|6.0e-09|-4.529431e-01 -4.529431e-01| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-------------------------------------------------------------------
 number of iterations   = 20
 primal objective value = -4.52943099e-01
 dual   objective value = -4.52943087e-01
 gap := trace(XZ)       = 6.04e-09
 relative gap           = 3.17e-09
 actual relative gap    = -6.00e-09
 rel. primal infeas     = 6.72e-10
 rel. dual   infeas     = 3.81e-12
 norm(X), norm(y), norm(Z) = 3.6e+01, 1.0e+02, 7.3e+01
 norm(A), norm(b), norm(C) = 4.7e+02, 6.0e+02, 7.7e+01
 Total CPU time (secs)  = 0.18
 CPU time per iteration = 0.01
 termination code       =  0
 DIMACS errors: 1.5e-09  0.0e+00  5.5e-12  0.0e+00  -6.0e-09  3.2e-09
-------------------------------------------------------------------

ans =

    0.4529

Iteration   6   Total error is: 0.0025777

 num. of constraints = 65
 dim. of socp   var  = 66,   num. of socp blk  =  1
 dim. of linear var  = 800
*******************************************************************
   SDPT3: Infeasible path-following algorithms
*******************************************************************
```

```
 version  predcorr  gam  expon  scale_data
   HKM      1      0.000   1        0
it pstep dstep pinfeas dinfeas  gap      prim-obj      dual-obj    cputime
-------------------------------------------------------------------
 0|0.000|0.000|1.0e+00|3.5e+01|8.3e+06| 4.228693e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.992|2.0e-07|3.8e-01|1.3e+05| 4.302749e+04 -1.844255e+01| 0:0:00| chol  1↙
1
 2|1.000|1.000|7.3e-08|3.3e-02|2.4e+04| 2.032390e+04 -2.379644e+01| 0:0:00| chol  1↙
1
 3|0.991|0.987|9.5e-09|1.0e-02|4.6e+02| 4.136846e+02 -1.878990e+01| 0:0:00| chol  1↙
1
 4|0.505|0.442|5.8e-08|6.2e-03|3.8e+02| 3.488158e+02 -1.408017e+01| 0:0:00| chol  1↙
1
 5|0.480|0.894|3.0e-08|7.4e-04|3.2e+02| 3.102779e+02 -9.335271e+00| 0:0:00| chol  1↙
1
 6|0.391|1.000|1.8e-08|1.0e-05|3.0e+02| 2.837561e+02 -1.402989e+01| 0:0:00| chol  1↙
1
 7|1.000|1.000|4.6e-11|1.0e-06|2.1e+02| 1.984171e+02 -8.155111e+00| 0:0:00| chol  1↙
1
 8|0.804|0.883|1.3e-11|2.1e-07|7.5e+01| 7.067356e+01 -4.110138e+00| 0:0:00| chol  1↙
1
 9|1.000|1.000|1.8e-11|1.0e-08|5.0e+01| 4.748399e+01 -2.314654e+00| 0:0:00| chol  1↙
1
10|0.885|1.000|2.1e-12|1.0e-09|1.9e+01| 1.675773e+01 -1.855836e+00| 0:0:00| chol  1↙
1
11|1.000|1.000|1.2e-13|1.0e-10|8.0e+00| 7.392069e+00 -6.220799e-01| 0:0:00| chol  1↙
1
12|1.000|1.000|5.0e-14|1.1e-11|2.3e+00| 1.838351e+00 -4.171888e-01| 0:0:00| chol  1↙
1
13|1.000|1.000|6.7e-13|2.0e-12|9.0e-01| 5.789460e-01 -3.213858e-01| 0:0:00| chol  1↙
1
14|0.943|0.920|5.5e-12|1.3e-12|1.3e-01|-1.643737e-01 -2.962526e-01| 0:0:00| chol  2↙
2
15|1.000|1.000|2.1e-13|1.1e-12|4.1e-02|-2.522103e-01 -2.933883e-01| 0:0:00| chol  2↙
2
16|0.952|0.970|9.5e-13|1.0e-12|2.6e-03|-2.902278e-01 -2.928764e-01| 0:0:00| chol  2↙
2
17|0.934|0.981|5.5e-12|1.0e-12|2.0e-04|-2.926523e-01 -2.928556e-01| 0:0:00| chol  3↙
3
18|0.992|1.000|1.8e-11|1.1e-12|3.3e-05|-2.928223e-01 -2.928551e-01| 0:0:00| chol  4↙
5
19|1.000|1.000|4.8e-11|1.6e-12|3.0e-06|-2.928520e-01 -2.928550e-01| 0:0:00| chol 10↙
10
20|0.998|0.999|1.4e-11|2.5e-12|3.5e-08|-2.928550e-01 -2.928550e-01| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-------------------------------------------------------------------
 number of iterations   = 20
 primal objective value = -2.92854961e-01
 dual   objective value = -2.92855000e-01
 gap := trace(XZ)       = 3.47e-08
 relative gap           = 2.19e-08
 actual relative gap    = 2.44e-08
 rel. primal infeas     = 1.40e-11
```

```
 rel. dual   infeas     = 2.46e-12
 norm(X), norm(y), norm(Z) = 3.6e+01, 1.0e+02, 7.4e+01
 norm(A), norm(b), norm(C) = 4.8e+02, 6.3e+02, 7.7e+01
 Total CPU time (secs)  = 0.13
 CPU time per iteration = 0.01
 termination code       =  0
 DIMACS errors: 3.0e-11  0.0e+00  3.5e-12  0.0e+00  2.4e-08  2.2e-08
------------------------------------------------------------------

ans =

    0.2929

Iteration   7   Total error is: 0.0020061

 num. of constraints = 65
 dim. of socp   var  = 66,   num. of socp blk  =  1
 dim. of linear var  = 800
*******************************************************************
   SDPT3: Infeasible path-following algorithms
*******************************************************************
 version  predcorr  gam  expon  scale_data
   HKM      1      0.000   1        0
it pstep dstep pinfeas dinfeas  gap      prim-obj      dual-obj    cputime
-------------------------------------------------------------------
 0|0.000|0.000|1.0e+00|3.5e+01|8.4e+06| 4.294106e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.992|1.9e-07|4.0e-01|1.4e+05| 4.369084e+04 -1.824779e+01| 0:0:00| chol  1↙
1
 2|1.000|1.000|7.1e-08|3.3e-02|2.6e+04| 2.162055e+04 -2.541807e+01| 0:0:00| chol  1↙
1
 3|0.991|0.987|9.7e-09|1.0e-02|4.9e+02| 4.423316e+02 -1.970487e+01| 0:0:00| chol  1↙
1
 4|0.521|0.445|5.6e-08|6.2e-03|4.0e+02| 3.673725e+02 -1.483654e+01| 0:0:00| chol  1↙
1
 5|0.506|0.872|2.8e-08|8.8e-04|3.4e+02| 3.247605e+02 -9.891467e+00| 0:0:00| chol  1↙
1
 6|0.372|1.000|1.8e-08|1.0e-05|3.1e+02| 2.981878e+02 -1.503917e+01| 0:0:00| chol  1↙
1
 7|1.000|1.000|4.9e-11|1.0e-06|2.2e+02| 2.093915e+02 -8.607808e+00| 0:0:00| chol  1↙
1
 8|0.802|0.884|1.4e-11|2.0e-07|8.0e+01| 7.536709e+01 -4.385553e+00| 0:0:00| chol  1↙
1
 9|1.000|1.000|1.9e-11|1.0e-08|5.3e+01| 5.074904e+01 -2.441480e+00| 0:0:00| chol  1↙
1
10|0.874|1.000|2.3e-12|1.0e-09|2.0e+01| 1.815881e+01 -1.938439e+00| 0:0:00| chol  1↙
1
11|1.000|1.000|1.7e-14|1.0e-10|8.6e+00| 8.041742e+00 -5.934776e-01| 0:0:00| chol  1↙
1
12|1.000|1.000|8.5e-14|1.1e-11|2.6e+00| 2.197703e+00 -3.708511e-01| 0:0:00| chol  1↙
1
13|1.000|1.000|1.5e-12|2.0e-12|1.0e+00| 7.703774e-01 -2.517114e-01| 0:0:00| chol  1↙
1
14|0.942|0.994|2.4e-12|1.1e-12|1.7e-01|-5.203212e-02 -2.192205e-01| 0:0:00| chol  2↙
```

```
2
15|1.000|1.000|2.4e-13|1.0e-12|6.0e-02|-1.577643e-01 -2.173614e-01| 0:0:00| chol  1↙
2
16|1.000|1.000|4.7e-13|1.0e-12|1.1e-02|-2.051136e-01 -2.165355e-01| 0:0:00| chol  2↙
2
17|0.958|0.978|1.0e-12|1.0e-12|6.7e-04|-2.157792e-01 -2.164539e-01| 0:0:00| chol  2↙
2
18|0.983|1.000|4.7e-11|1.0e-12|5.7e-05|-2.163943e-01 -2.164514e-01| 0:0:00| chol  3↙
4
19|1.000|1.000|2.0e-11|1.5e-12|5.2e-06|-2.164460e-01 -2.164512e-01| 0:0:00| chol  6↙
7
20|1.000|1.000|1.0e-11|2.3e-12|7.6e-08|-2.164511e-01 -2.164512e-01| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-------------------------------------------------------------------
 number of iterations   = 20
 primal objective value = -2.16451123e-01
 dual   objective value = -2.16451199e-01
 gap := trace(XZ)       = 7.57e-08
 relative gap           = 5.28e-08
 actual relative gap    = 5.31e-08
 rel. primal infeas     = 1.01e-11
 rel. dual   infeas     = 2.25e-12
 norm(X), norm(y), norm(Z) = 3.6e+01, 1.0e+02, 7.5e+01
 norm(A), norm(b), norm(C) = 4.8e+02, 6.4e+02, 7.7e+01
 Total CPU time (secs)  = 0.15
 CPU time per iteration = 0.01
 termination code       =  0
 DIMACS errors: 2.2e-11  0.0e+00  3.2e-12  0.0e+00  5.3e-08  5.3e-08
-------------------------------------------------------------------

ans =

    0.2165

Iteration   8   Total error is: 0.0016664

 num. of constraints = 65
 dim. of socp   var  = 66,   num. of socp blk  =  1
 dim. of linear var  = 800
*******************************************************************
   SDPT3: Infeasible path-following algorithms
*******************************************************************
 version  predcorr  gam  expon  scale_data
   HKM      1      0.000   1        0
it pstep dstep pinfeas dinfeas  gap      prim-obj      dual-obj    cputime
-------------------------------------------------------------------
 0|0.000|0.000|1.0e+00|3.5e+01|8.5e+06| 4.356961e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.991|1.9e-07|4.1e-01|1.4e+05| 4.432901e+04 -1.836504e+01| 0:0:00| chol  1↙
1
 2|1.000|1.000|6.9e-08|3.3e-02|2.7e+04| 2.258498e+04 -2.674512e+01| 0:0:00| chol  1↙
1
 3|0.991|0.986|9.8e-09|1.0e-02|5.1e+02| 4.651557e+02 -2.052786e+01| 0:0:00| chol  1↙
1
```

```
 4|0.534|0.448|5.5e-08|6.1e-03|4.1e+02| 3.823303e+02 -1.549261e+01| 0:0:00| chol  1↙
1
 5|0.511|0.865|2.7e-08|9.1e-04|3.5e+02| 3.377952e+02 -1.035420e+01| 0:0:00| chol  1↙
1
 6|0.365|1.000|1.7e-08|1.0e-05|3.3e+02| 3.105252e+02 -1.591810e+01| 0:0:00| chol  1↙
1
 7|1.000|1.000|4.9e-11|1.0e-06|2.3e+02| 2.171180e+02 -9.049470e+00| 0:0:00| chol  1↙
1
 8|0.799|0.873|1.4e-11|2.1e-07|8.3e+01| 7.873724e+01 -4.628097e+00| 0:0:00| chol  1↙
1
 9|1.000|1.000|2.0e-11|1.0e-08|5.6e+01| 5.320081e+01 -2.562586e+00| 0:0:00| chol  1↙
1
10|0.871|1.000|2.5e-12|1.0e-09|2.1e+01| 1.909317e+01 -1.973325e+00| 0:0:00| chol  1↙
1
11|1.000|1.000|4.7e-14|1.0e-10|9.1e+00| 8.512417e+00 -5.835957e-01| 0:0:00| chol  1↙
1
12|1.000|1.000|8.9e-14|1.1e-11|2.8e+00| 2.458873e+00 -3.434438e-01| 0:0:00| chol  1↙
1
13|1.000|1.000|1.7e-13|2.0e-12|1.1e+00| 9.047694e-01 -2.048521e-01| 0:0:00| chol  1↙
1
14|0.943|1.000|3.7e-13|1.1e-12|2.0e-01| 2.850458e-02 -1.673662e-01| 0:0:00| chol  2↙
2
15|1.000|1.000|4.9e-13|1.0e-12|7.6e-02|-8.861571e-02 -1.644085e-01| 0:0:00| chol  2↙
2
16|1.000|0.999|6.7e-13|1.0e-12|1.3e-02|-1.504512e-01 -1.631495e-01| 0:0:00| chol  2↙
2
17|1.000|1.000|2.1e-12|1.0e-12|3.0e-03|-1.600421e-01 -1.630495e-01| 0:0:00| chol  2↙
2
18|1.000|0.999|1.8e-12|1.0e-12|3.7e-04|-1.626629e-01 -1.630300e-01| 0:0:00| chol  2↙
2
19|0.996|1.000|3.3e-11|1.0e-12|1.5e-05|-1.630142e-01 -1.630287e-01| 0:0:00| chol  4↙
4
20|0.998|1.000|2.7e-11|1.5e-12|2.5e-07|-1.630284e-01 -1.630287e-01| 0:0:00| chol
  linsysolve: Schur complement matrix not positive definite
  switch to LU factor. lu 30  30
21|0.997|0.973|2.3e-10|2.3e-12|3.3e-09|-1.630286e-01 -1.630287e-01| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
-------------------------------------------------------------------
 number of iterations   = 21
 primal objective value = -1.63028639e-01
 dual   objective value = -1.63028658e-01
 gap := trace(XZ)       = 3.34e-09
 relative gap           = 2.52e-09
 actual relative gap    = 1.41e-08
 rel. primal infeas     = 2.27e-10
 rel. dual   infeas     = 2.29e-12
 norm(X), norm(y), norm(Z) = 3.7e+01, 1.0e+02, 7.5e+01
 norm(A), norm(b), norm(C) = 4.8e+02, 6.6e+02, 7.7e+01
 Total CPU time (secs)  = 0.16
 CPU time per iteration = 0.01
 termination code       =  0
 DIMACS errors: 4.9e-10  0.0e+00  3.3e-12  0.0e+00  1.4e-08  2.5e-09
-------------------------------------------------------------------
```

```
ans =

    0.1630

Iteration   9   Total error is: 0.0013801

 num. of constraints = 65
 dim. of socp   var  = 66,   num. of socp blk  =  1
 dim. of linear var  = 800
*******************************************************************
   SDPT3: Infeasible path-following algorithms
*******************************************************************
 version  predcorr  gam  expon  scale_data
   HKM      1      0.000   1        0
it pstep dstep pinfeas dinfeas  gap      prim-obj      dual-obj    cputime
-------------------------------------------------------------------
 0|0.000|0.000|1.0e+00|3.5e+01|8.6e+06| 4.406663e+04  0.000000e+00| 0:0:00| chol  1↙
1
 1|1.000|0.991|1.9e-07|4.1e-01|1.5e+05| 4.483374e+04 -1.864678e+01| 0:0:00| chol  1↙
1
 2|1.000|1.000|6.7e-08|3.3e-02|2.7e+04| 2.325858e+04 -2.776812e+01| 0:0:00| chol  1↙
1
 3|0.991|0.986|1.0e-08|1.0e-02|5.3e+02| 4.819796e+02 -2.121360e+01| 0:0:00| chol  1↙
1
 4|0.543|0.449|5.4e-08|6.1e-03|4.2e+02| 3.940013e+02 -1.601603e+01| 0:0:00| chol  1↙
1
 5|0.504|0.863|2.7e-08|9.2e-04|3.6e+02| 3.491109e+02 -1.070244e+01| 0:0:00| chol  1↙
1
 6|0.366|1.000|1.7e-08|1.0e-05|3.4e+02| 3.207670e+02 -1.662121e+01| 0:0:00| chol  1↙
1
 7|1.000|1.000|4.7e-11|1.0e-06|2.3e+02| 2.222957e+02 -9.417276e+00| 0:0:00| chol  1↙
1
 8|0.795|0.858|1.4e-11|2.3e-07|8.6e+01| 8.086444e+01 -4.800060e+00| 0:0:00| chol  1↙
1
 9|1.000|1.000|1.8e-11|1.0e-08|5.8e+01| 5.485732e+01 -2.645647e+00| 0:0:00| chol  1↙
1
10|0.873|1.000|2.3e-12|1.0e-09|2.2e+01| 1.962716e+01 -1.976039e+00| 0:0:00| chol  1↙
1
11|1.000|1.000|8.8e-15|1.0e-10|9.4e+00| 8.821757e+00 -5.804795e-01| 0:0:00| chol  1↙
1
12|1.000|1.000|9.0e-14|1.1e-11|2.9e+00| 2.611170e+00 -3.264960e-01| 0:0:00| chol  1↙
1
13|1.000|1.000|2.9e-13|2.0e-12|1.2e+00| 9.846600e-01 -1.768418e-01| 0:0:00| chol  1↙
1
14|0.945|1.000|2.5e-12|1.1e-12|2.2e-01| 8.028336e-02 -1.359621e-01| 0:0:00| chol  2↙
2
15|1.000|1.000|1.8e-13|1.0e-12|8.7e-02|-4.523717e-02 -1.319393e-01| 0:0:00| chol  2↙
2
16|0.975|0.992|6.0e-13|1.0e-12|1.4e-02|-1.163007e-01 -1.302217e-01| 0:0:00| chol  2↙
2
17|1.000|1.000|2.4e-12|1.0e-12|4.7e-03|-1.254321e-01 -1.300867e-01| 0:0:00| chol  2↙
2
18|1.000|1.000|1.1e-12|1.0e-12|8.2e-04|-1.292190e-01 -1.300433e-01| 0:0:00| chol  2↙
2
```

```
19|1.000|1.000|7.5e-12|1.0e-12|2.3e-04|-1.298086e-01 -1.300395e-01| 0:0:00| chol  2↙
2
20|1.000|1.000|5.3e-11|1.5e-12|4.2e-05|-1.299960e-01 -1.300383e-01| 0:0:00| chol  3↙
3
21|1.000|1.000|3.0e-12|2.3e-12|2.5e-06|-1.300356e-01 -1.300381e-01| 0:0:00| chol  7↙
6
22|1.000|1.000|6.4e-11|1.0e-12|3.7e-08|-1.300380e-01 -1.300381e-01| 0:0:00|
  stop: max(relative gap, infeasibilities) < 1.00e-07
------------------------------------------------------------------
 number of iterations   = 22
 primal objective value = -1.30038040e-01
 dual   objective value = -1.30038076e-01
 gap := trace(XZ)       = 3.73e-08
 relative gap           = 2.96e-08
 actual relative gap    = 2.92e-08
 rel. primal infeas     = 6.41e-11
 rel. dual   infeas     = 1.00e-12
 norm(X), norm(y), norm(Z) = 3.7e+01, 1.0e+02, 7.5e+01
 norm(A), norm(b), norm(C) = 4.8e+02, 6.8e+02, 7.7e+01
 Total CPU time (secs)  = 0.16
 CPU time per iteration = 0.01
 termination code       =  0
 DIMACS errors: 1.4e-10  0.0e+00  1.4e-12  0.0e+00  2.9e-08  3.0e-08
------------------------------------------------------------------

ans =

    0.1300

Iteration   10   Total error is: 0.001169
The total representation error of the testing signals is: 0.011753
```