

```
>> 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
6 linear variables from unrestricted variable.
```

```
*** convert ublk to linear blk
```

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*****  
*****
```

```
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|3.4e+00|5.1e+00|2.7e+06| 2.254888e+04| 0:0:00|2.7e+06|1.0e+00|1.0e+00| chol 1 1 ✓  
1|0.952|0.952|1.7e-01|2.5e-01|1.7e+05| 2.154616e+04| 0:0:00|4.8e+04|1.0e+00|5.1e-02| chol 1 1 ✓  
2|0.739|0.739|9.3e-02|1.4e-01|1.1e+05| 1.716322e+04| 0:0:00|1.4e+04|9.9e-01|2.7e-02| chol 1 1 ✓  
3|1.000|1.000|5.0e-02|7.4e-02|8.0e+04| 1.510766e+04| 0:0:00|1.6e+03|8.9e-01|1.3e-02| chol 1 1 ✓  
4|0.859|0.859|2.0e-02|3.0e-02|3.0e+04| 6.884898e+03| 0:0:00|7.8e+01|1.0e+00|6.0e-03| chol 1 1 ✓  
5|0.836|0.836|2.9e-03|4.3e-03|3.6e+03| 7.894108e+02| 0:0:00|3.0e+01|1.2e+00|1.0e-03| chol 1 1 ✓  
6|0.656|0.656|2.4e-03|4.1e-03|3.2e+03| 5.841791e+02| 0:0:00|1.3e+01|1.2e+00|8.7e-04| chol 1 1 ✓  
7|0.555|0.555|2.3e-03|4.0e-03|3.3e+03| 7.183191e+02| 0:0:00|8.8e+00|1.2e+00|8.0e-04| chol 1 1 ✓  
8|0.936|0.936|5.8e-04|1.1e-03|8.0e+02| 5.521046e+01| 0:0:00|4.5e+00|1.3e+00|2.1e-04| chol 1 1 ✓  
9|1.000|1.000|3.9e-04|6.6e-04|5.0e+02| 2.655784e+00| 0:0:00|1.1e+00|1.3e+00|1.5e-04| chol 1 1 ✓  
10|1.000|1.000|1.9e-04|3.4e-04|2.4e+02|-7.185595e+01| 0:0:00|7.5e-01|1.3e+00|7.4e-05| chol 1 1 ✓  
11|1.000|1.000|9.1e-05|1.7e-04|1.1e+02|-1.029333e+02| 0:0:00|3.7e-01|1.4e+00|3.6e-05| chol 1 1 ✓  
12|1.000|1.000|3.3e-05|6.8e-05|3.9e+01|-1.224474e+02| 0:0:00|1.7e-01|1.4e+00|1.4e-05| chol 1 1 ✓  
13|1.000|1.000|1.5e-05|3.6e-05|1.7e+01|-1.279682e+02| 0:0:00|6.0e-02|1.5e+00|6.7e-06| chol 1 1 ✓  
14|1.000|1.000|7.0e-06|2.4e-05|7.2e+00|-1.306643e+02| 0:0:00|2.7e-02|1.6e+00|3.2e-06| chol 1 1 ✓  
15|1.000|1.000|3.6e-06|1.9e-05|3.5e+00|-1.316496e+02| 0:0:00|1.2e-02|1.7e+00|1.8e-06| chol 1 1 ✓  
16|1.000|1.000|9.9e-07|1.5e-05|8.9e-01|-1.324608e+02| 0:0:00|6.2e-03|1.8e+00|5.1e-07| chol 1 1 ✓
```

```

17|1.000|1.000|3.7e-07|6.2e-06|3.2e-01|-1.326270e+02| 0:0:00|1.8e-03|1.8e+00|2.0e-✓
07| chol 1 1
18|0.994|0.994|9.3e-08|2.5e-06|7.9e-02|-1.327068e+02| 0:0:00|6.8e-04|1.9e+00|5.1e-✓
08| chol 1 1
19|1.000|1.000|6.5e-08|1.0e-06|5.4e-02|-1.327143e+02| 0:0:00|1.8e-04|1.9e+00|3.6e-✓
08| chol 1 1
20|1.000|1.000|2.7e-08|4.2e-07|2.2e-02|-1.327254e+02| 0:0:00|1.2e-04|1.9e+00|1.5e-✓
08| chol 1 1
21|0.968|0.968|5.4e-09|1.8e-07|4.3e-03|-1.327320e+02| 0:0:00|5.2e-05|1.9e+00|3.0e-✓
09| chol 1 1
22|1.000|1.000|2.7e-09|7.1e-08|2.1e-03|-1.327328e+02| 0:0:00|1.0e-05|1.9e+00|1.4e-✓
09| chol 1 1
23|1.000|1.000|8.5e-10|3.0e-08|5.1e-04|-1.327334e+02| 0:0:00|4.9e-06|2.0e+00|3.6e-✓
10| chol 1 1
24|1.000|1.000|6.4e-10|1.3e-08|2.3e-04|-1.327335e+02| 0:0:00|1.2e-06|2.0e+00|1.6e-✓
10| chol 1 1
25|1.000|1.000|9.5e-10|5.1e-09|5.7e-05|-1.327336e+02| 0:0:00|5.3e-07|2.0e+00|4.0e-✓
11| chol 1 1
26|1.000|1.000|3.7e-09|5.1e-09|2.8e-05|-1.327336e+02| 0:0:00|1.3e-07|2.0e+00|1.7e-✓
11| chol 1 1
27|1.000|1.000|5.7e-09|5.1e-09|9.1e-06|-1.327336e+02| 0:0:00|6.6e-08|2.0e+00|4.3e-✓
12|

```

Stop: max(relative gap,infeasibilities) < 1.00e-07

```

-----
number of iterations    = 27
primal objective value = -1.32733621e+02
dual   objective value = -1.32733626e+02
gap := trace(XZ)       = 9.15e-06
relative gap           = 6.84e-08
actual relative gap    = 2.03e-08
rel. primal infeas     = 5.72e-09
rel. dual   infeas     = 5.09e-09
norm(X), norm(y), norm(Z) = 2.8e+01, 1.8e+02, 2.1e+01
norm(A), norm(b), norm(C) = 9.4e+02, 5.6e+00, 2.5e+02
Total CPU time (secs)   = 0.29
CPU time per iteration = 0.01
termination code        = 0
DIMACS errors: 5.7e-09  0.0e+00  5.1e-09  0.0e+00  2.0e-08  3.4e-08
-----

```

ans =

132.7336

ans =

39.3031

Iteration 2 Total error is: 0.020827

ans =

39.3031

```
Iteration    3    Total error is: 0.020827
```

```
ans =
```

```
39.3031
```

```
Iteration    4    Total error is: 0.020827
```

```
ans =
```

```
39.3031
```

```
Iteration    5    Total error is: 0.020827
```

```
ans =
```

```
39.3031
```

```
Iteration    6    Total error is: 0.020827
```

```
ans =
```

```
39.3031
```

```
Iteration    7    Total error is: 0.020827
```

```
ans =
```

```
39.3031
```

```
Iteration    8    Total error is: 0.020827
```

```
The total representation error of the testing signals is: 0.20994
```

```
>>
```