Ch.4, Exercise

**4. Sol :**

4.1

Hence

Here is a diagonal matrix with

Multipying at both sides

Implies the matrix has eigenvalues of and corresponding eigenvectors .

4.2 No since

has the dimension as , however its has

Hence if are different, the number of its eigenvalues are different.

**6. Sol**

**6.1 Solution:**

This is not the standard form of LSE as

estimate .

I change this. Since

-->

Hence This (1) is the standard form of LSE to estimate the inertia !!

Hence the LSE of inertia is

**Now some of you solve in other way**

Let us define

where Then we may write in this way. Define

Then the experiments are modeled as

This is

The equation (2) is the standard form of LSE except the **matrix measurement (not vector). Now** we may use LSE as vector measurement case,

Or since

* Kim’s comment: I think the **matrix** measurement is more concise**.**

**6.2 Solution: Observability**

Consider

Here

>> [U,S,D] = svd(

To get

And

-0.6077 -0.5221 -0.5940 -0.0241 -0.0575 -0.0381

0.0843 -0.7871 0.6075 -0.0388 -0.0311 0.0415

-0.7896 0.3170 0.5212 0.0175 0.0494 0.0399

0.0066 -0.0686 -0.0405 -0.0405 0.9959 -0.0124

-0.0027 0.0516 0.0014 -0.9980 -0.0369 0.0017

0.0049 -0.0008 -0.0693 0.0012 0.0096 0.9975

So that the most observable states as a combination is , and the worst observable states is

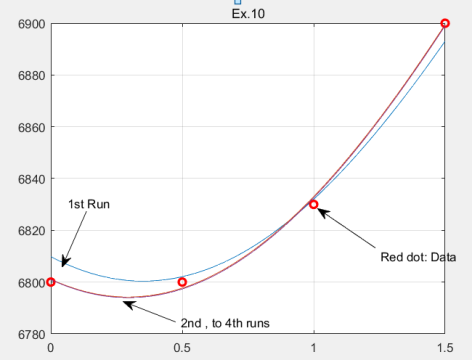
**8. Sol**

and measured data is

|  |  |
| --- | --- |
|  |  |
| 6800 | 0.0 |
| 6800 | 0.5 |
| 6830 | 1.0 |
| 6900 | 1.5 |

Estimate .

Here I have a result of matlab code as



First, I choose the initial guess values as

Why this value? Well to use Newton-Gauss method, it is important to guess the initial points, with this value by try and error, it may be roughly approximated,

Then if I continue to run for 4 steps, the values already converge to the values as

which is a good approximation in graph~~. How did Gauss by hand??? Wonderful~~

**10. Sol ;**

The orthonormal basis means

Then MMSE for is

Hence

**11. Sol**

11.1 Find the orthonormal basis from the basis of

The first pick up one vector as

The second

The third

Hence if