Assignment 4.3

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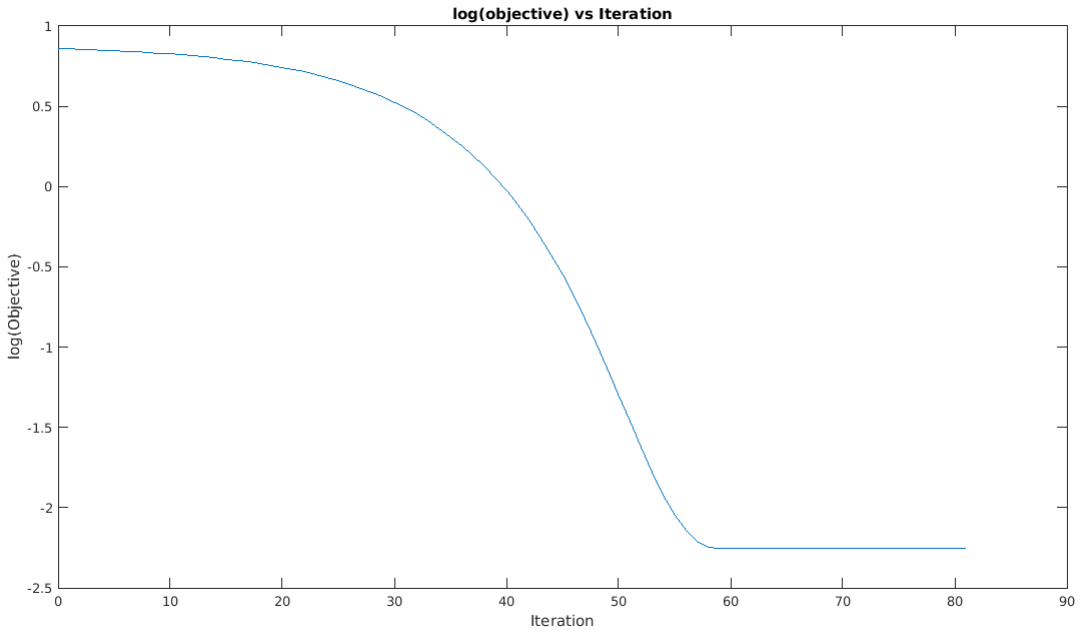
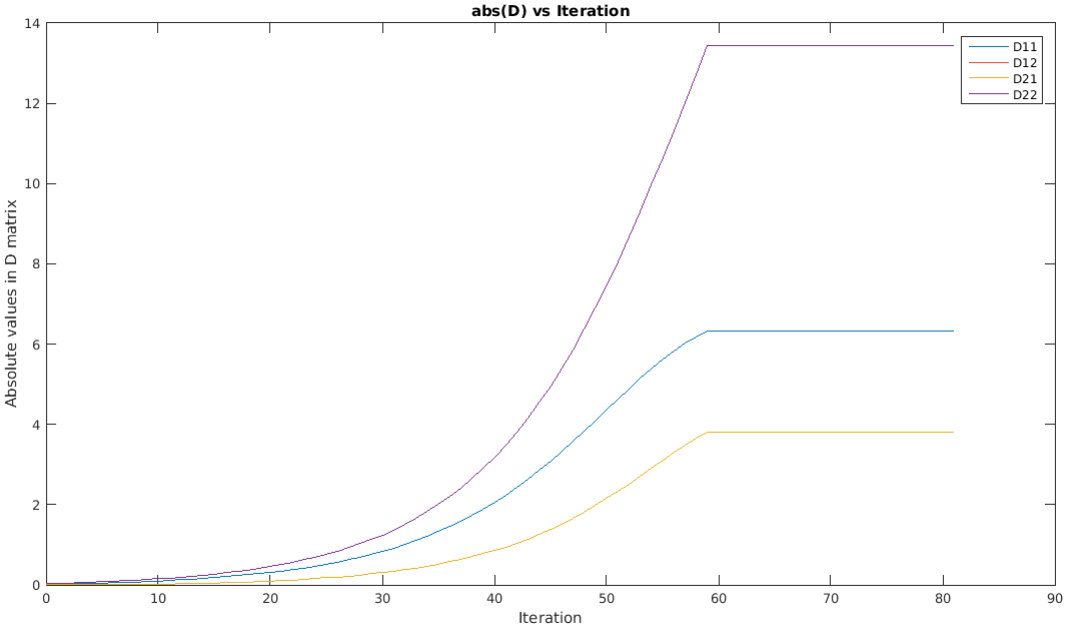
(a)

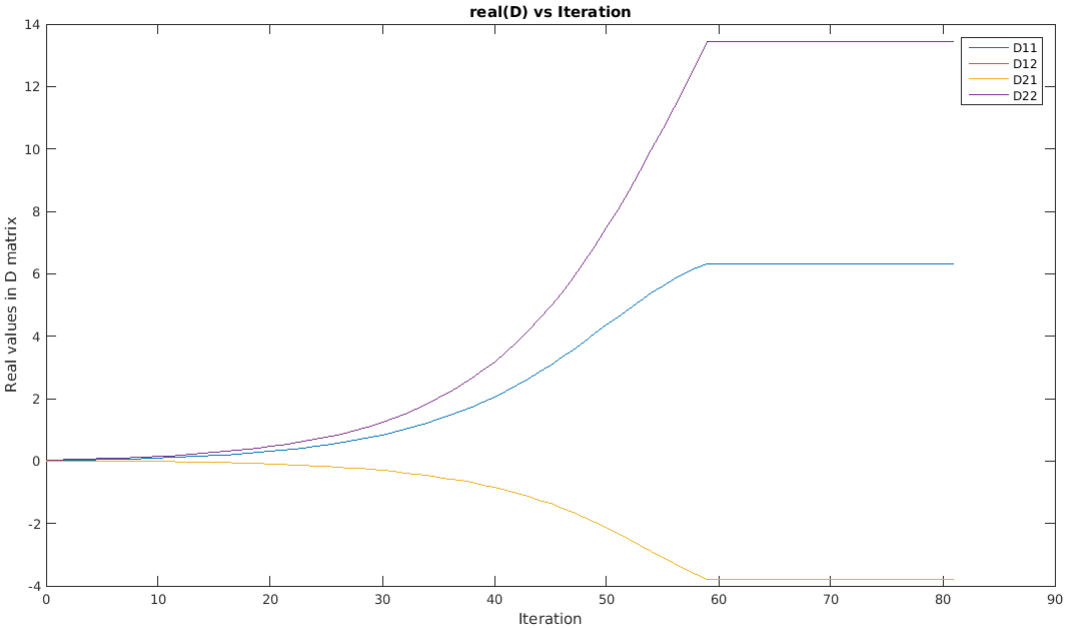
Using Modified Levenberg Marquardt Algorithm with $\lambda = 0.1$.

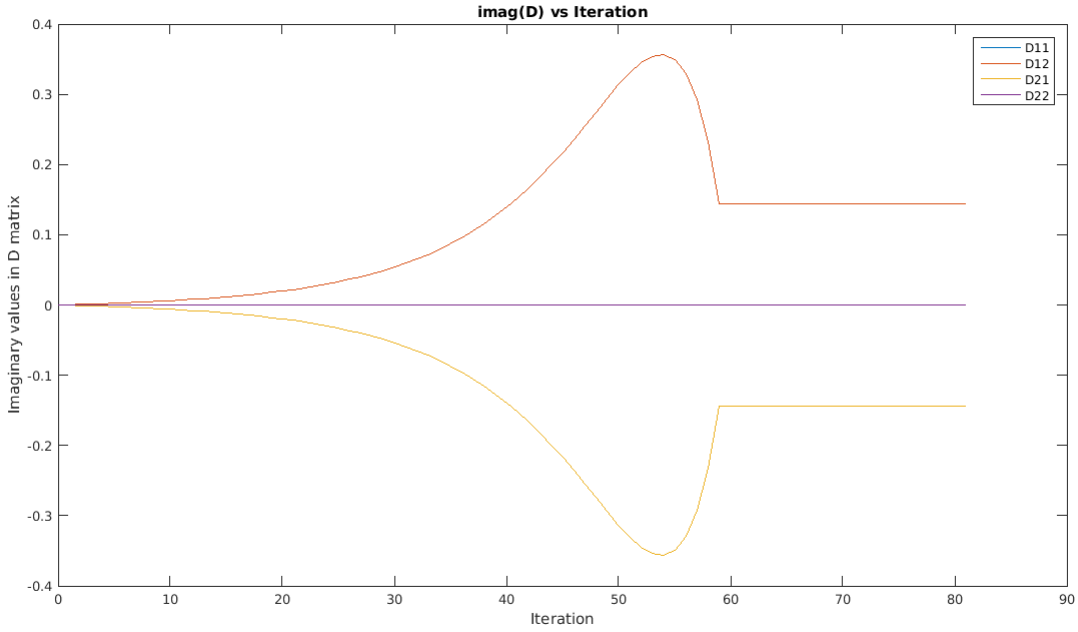
Optimal D

$$\begin{bmatrix} 6.3149 + 0.0000i & -3.8021 + 0.1439i \\ -3.8021 - 0.1439i & 13.4367 + 0.0000i \end{bmatrix}$$




abs(D) vs Iteration
Absolute values in D matrix
Iteration
D11
D12
D21
D22
0
2
4
6
8
10
12
14
0
10
20
30
40
50
60
70
80
90


real(D) vs Iteration
Real values in D matrix
Iteration
D11
D12
D21
D22
-4
-2
0
2
4
6
8
10
12
14
0
10
20
30
40
50
60
70
80
90


imag(D) vs Iteration
Imaginary values in D matrix
Iteration
D11
D12
D21
D22
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
0
10
20
30
40
50
60
70
80
90

(b)

Principal Direction Principal direction found out using eigen decomposition is:

$$\begin{bmatrix} 0.3979 - 0.0000i & -0.9168 + 0.0347i \end{bmatrix}$$

(c)

Diffusion Ratio Diffusion in the principal direction as compared to the diffusion in the direction orthogonal to it is:

$$3.2343$$

Found using ratios of diagonal elements