Lab 4 report - Timing synchronization

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25 October 2016

Task 1

See Matlab code in file *timesync.m*.

Task 2

See Matlab code in file *exercise2_ber.m*.

Task 3

See Matlab code in file *exercise2_ber.m*.

We can start doing the timing synchronization earlier. The same principle as implemented now can be used while the preamble is running.
Another possibility is to use the preamble as a reference, since the correct preamble is known by the receiver. If we shift the preamble over the interval of 4 symbols and then check for which shift the correlation is the highest, we get a good initial estimate for ϵ.

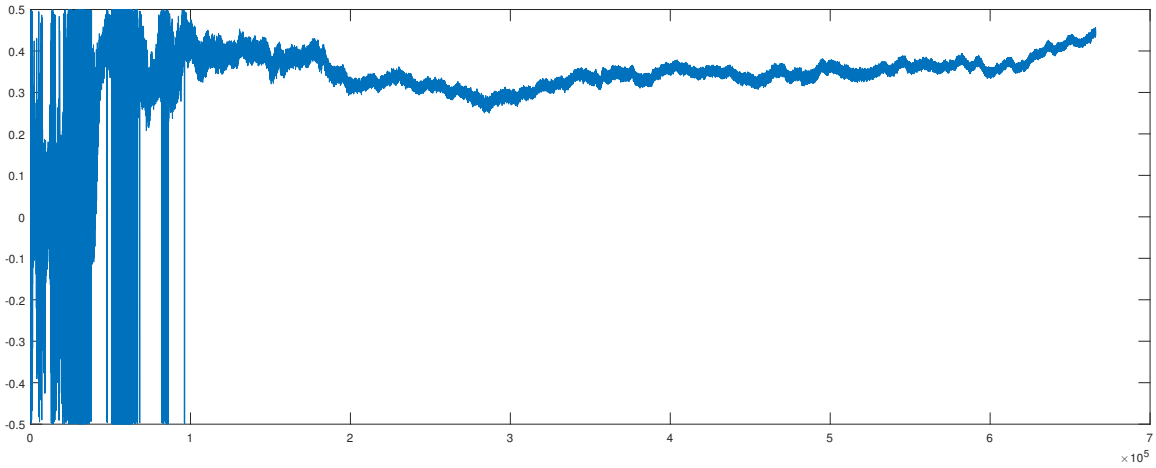

Figure 1: ϵ variation

Task 4

See Matlab code in file *exercise2_ber.m*.

For repeated executions of the algorithm, one becomes following results:

```
BER of linear interpolator: 0.012727, BER of cubic interpolator: 0.012678
BER of linear interpolator: 0.005942, BER of cubic interpolator: 0.005977
BER of linear interpolator: 0.007275, BER of cubic interpolator: 0.007285
BER of linear interpolator: 0.012878, BER of cubic interpolator: 0.012873
BER of linear interpolator: 0.003311, BER of cubic interpolator: 0.003287
BER of linear interpolator: 0.007811, BER of cubic interpolator: 0.007821
BER of linear interpolator: 0.001949, BER of cubic interpolator: 0.00184
BER of linear interpolator: 0.004164, BER of cubic interpolator: 0.004163
BER of linear interpolator: 0.006787, BER of cubic interpolator: 0.006786
BER of linear interpolator: 0.002188, BER of cubic interpolator: 0.00213
```

The BER when using the cubic interpolator is not much better than the linear one, while the complexity is quite a bit higher due to the matrix operations