HW5 Report

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■ HW5

– Simulate the symbol error rates (SERs) of the 16-QAM scheme with SNRs of 5dB, 10dB, 15dB, etc such that you can plot a SER curve.

和上課一樣使用16-QAM的scheme ， 除了上課模擬的10dB SNR以外
額外去跑其他SNR的值 ： `snr = [5:15];`

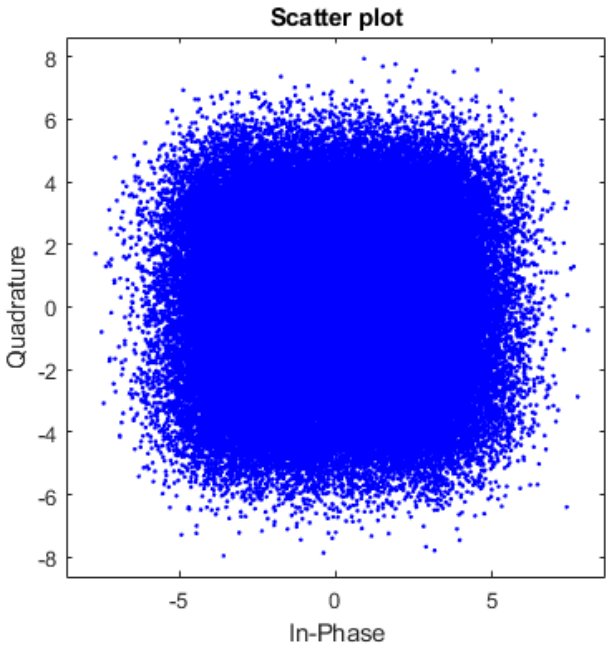
– Calculate the theoretical SERs and also plot a curve.

另外去計算理論值的SER curve ：

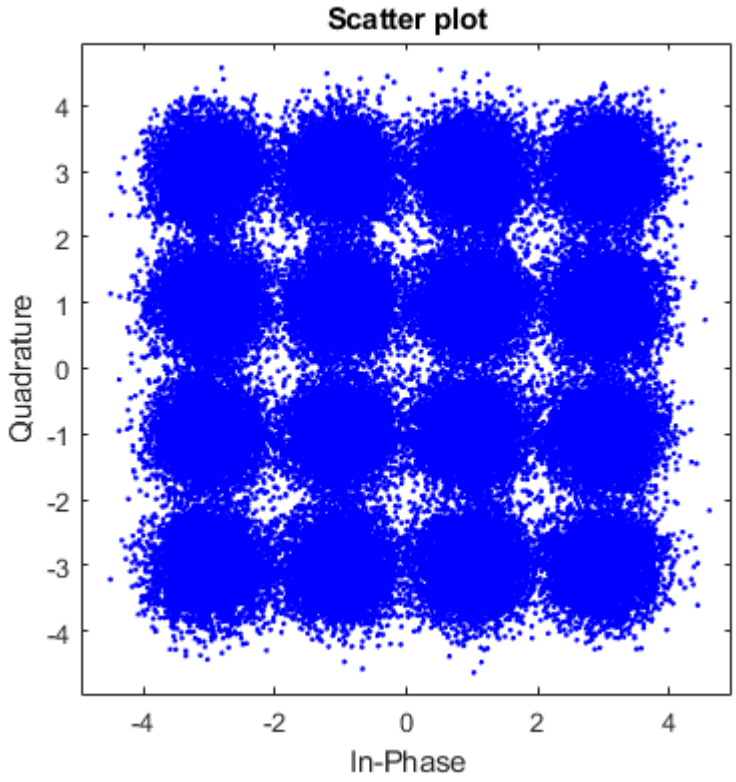
```
SER = TSER(t) = (3/2) * erfc(sqrt(Es/(10*N0)));
```

– Put these two curves in the same figure to see if your simulation results are OK.

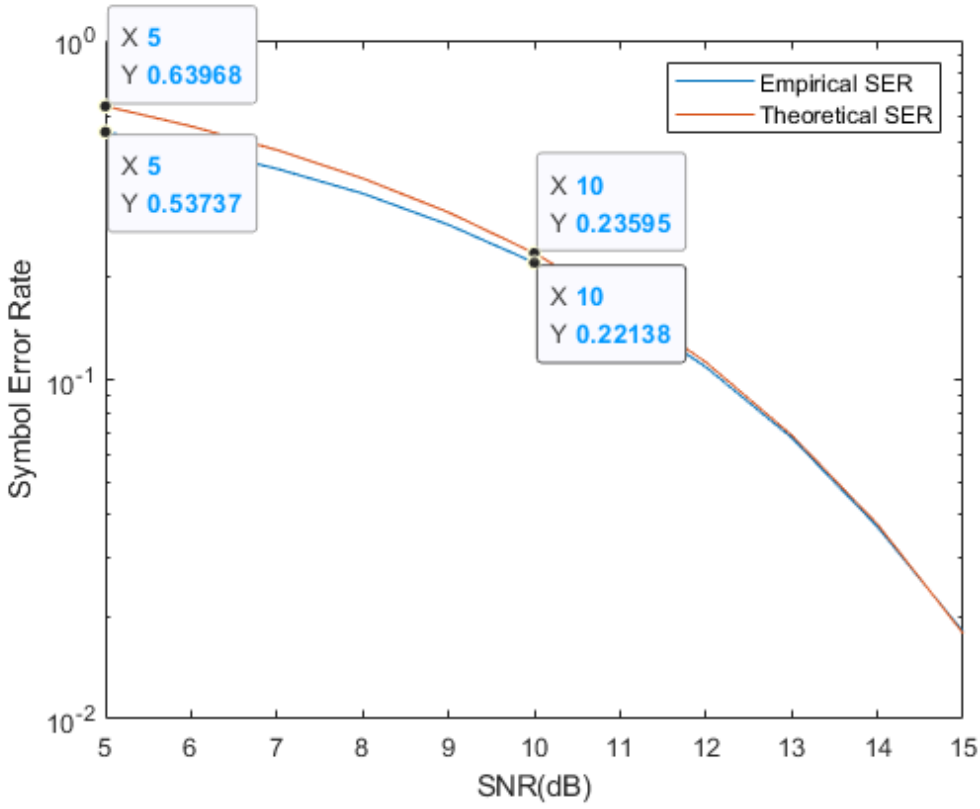
將結果圖畫在一起，
我模擬了20000個symbol用16-QAM傳，並且去算SER

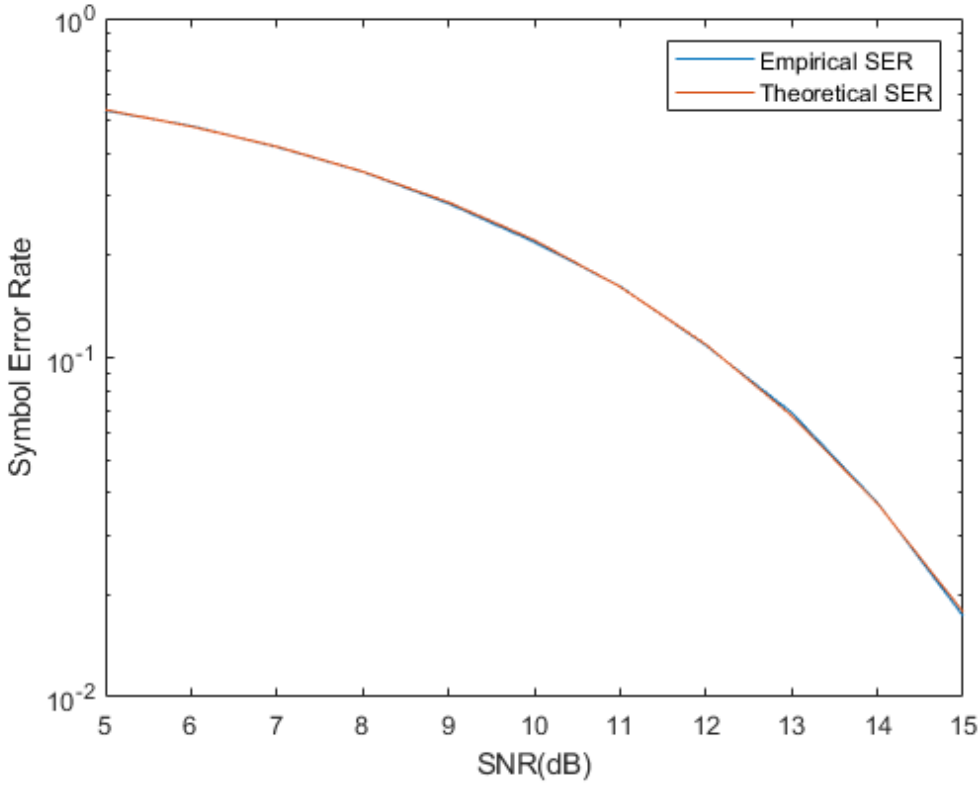


5 dB SNR mapping 的scatterplot



15 dB SNR mapping 的scatterplot





Conclusion

可以看到SNR越大錯誤率越低，和理論值相當接近。在SNR很小的時候，第一張SER的理論(紅線)和模擬出來(藍線)的結果差異比較大是因為理論值是大約估計的，

所以第二張圖有`2*(3/4) * erfc(sqrt(SNR(t)/10))-((3/4) * erfc(sqrt(SNR(t)/10)))^2`的SER才是最接近的

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