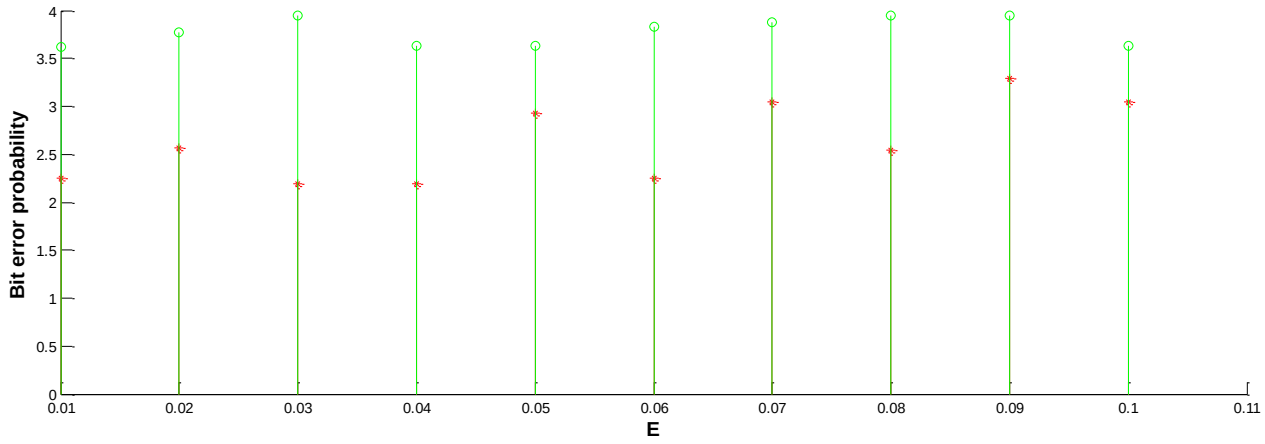
Q1) Average codeword length

The average codeword length obtained by simulation is L=1.9639 and the theoretical amount is L=1.97, which presents good corresponding.

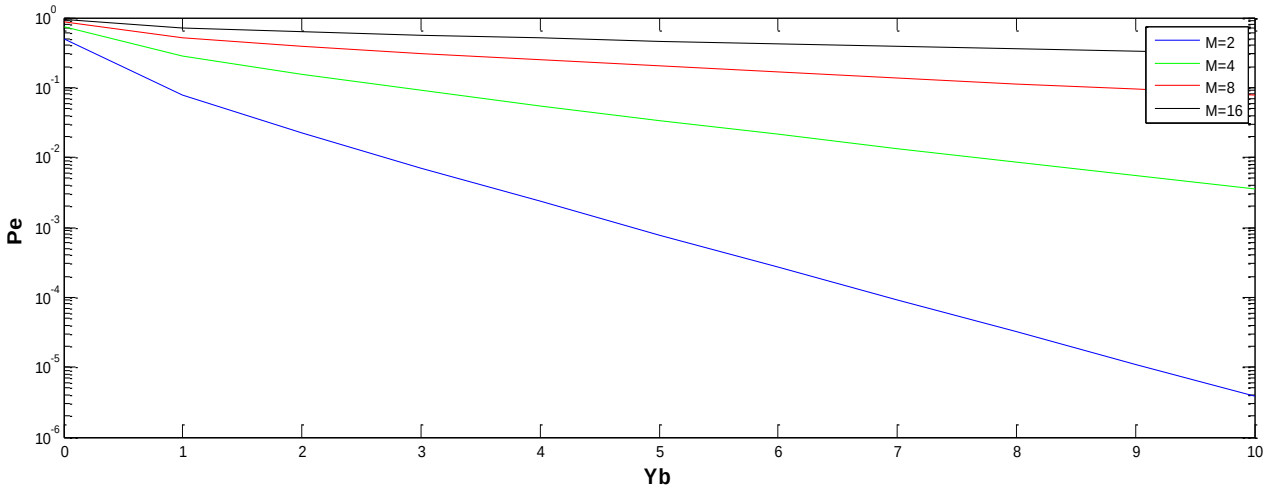
Q2) Coding and decoding process

According to the result of this simulation, the bit error probability in the case of using the best standard array (red scheme) is lower than using the worst standard array (green scheme).

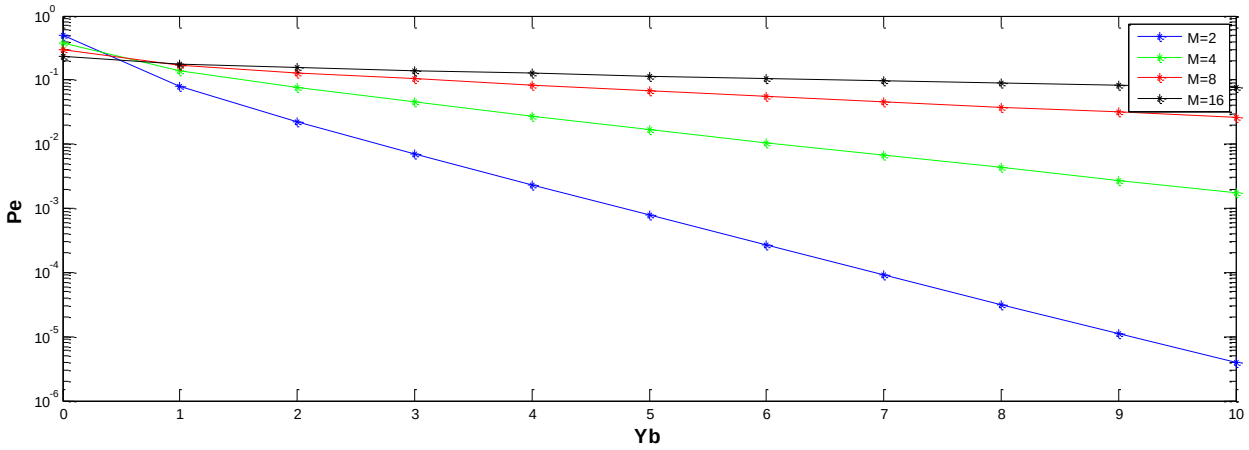


Q3) Pe for M-PAM and gray coding

Symbol error probability against γ_b in M-PAM modulation is as bellow:



Bit error probability by assuming gray coding is:



The obtained results show that Pe and M have an inverse relation.

Q4) Pe for BPSK and OOK

According to the below diagram, BPSK modulation causes a lower bit error probability.