ASP HW2

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Problem1 - The effect of different W, say W = 2.9, 3.1, 3, 3, or 3.5

Keeping μ (step size) fixed at 0.01 and τ (delay) at 7, observe the learning curve for different values of W.

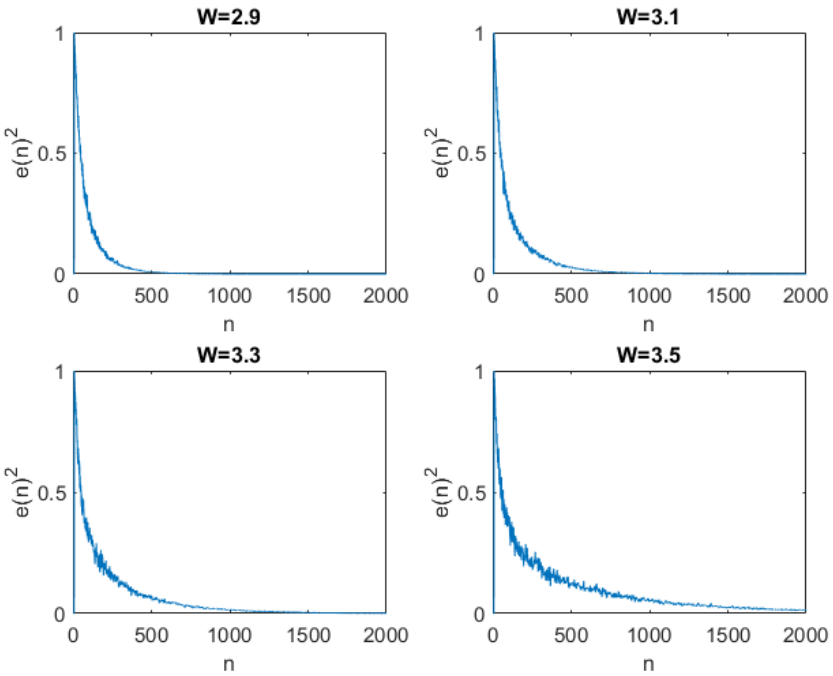

Figure 1: Different W - [2.9 , 3.1 , 3, 3 , 3.5]

The variation in W affects the channel parameters, and this influence becomes more obvious as W increases. Therefore, under the same μ and τ, it can be observed that with the increase in W, the learning curve converges to zero more slowly.

Problem2 - The effect of different delay τ

Keeping μ (step size) fixed at 0.01 and W fixed at 2.9, observe the learning curve for different values of τ

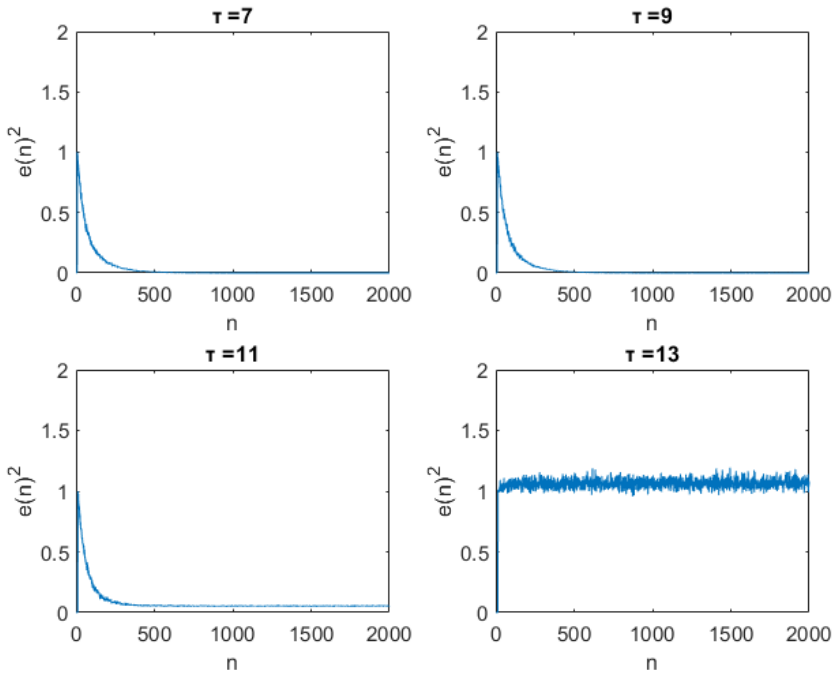

Figure 2: Different τ - [7, 9 , 11 , 13]

According to different delay values , it is observed that a larger delay leads to slower convergence, as illustrated in the figure for delay values of 7, 9. However, when the delay value exceeds the number of taps, convergence to zero is not achieved, as illustrated in the figure for a delay value of 11 , 13.

Problem3 - The effect of different step size μ

Keeping τ (delay) fixed at 7 and W fixed at 2.9, observe the learning curve for different values of μ

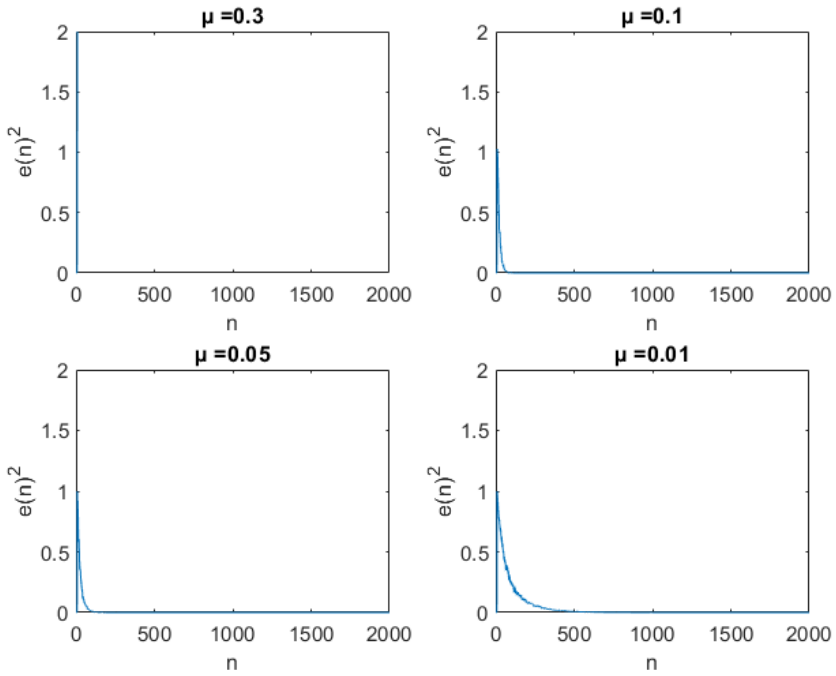

Figure 3: Different μ - [0.3 , 0.1 , 0.05 , 0.01]

Depending on different step sizes within the range $(0, \frac{2}{\lambda})$, the system typically converges stably. The value of the step size affects the convergence speed, but if the step size falls outside this range, it may lead to unstable convergence or even divergence.

Problem4 - The effect of adding white noise v(n) which corrupts μ(n)

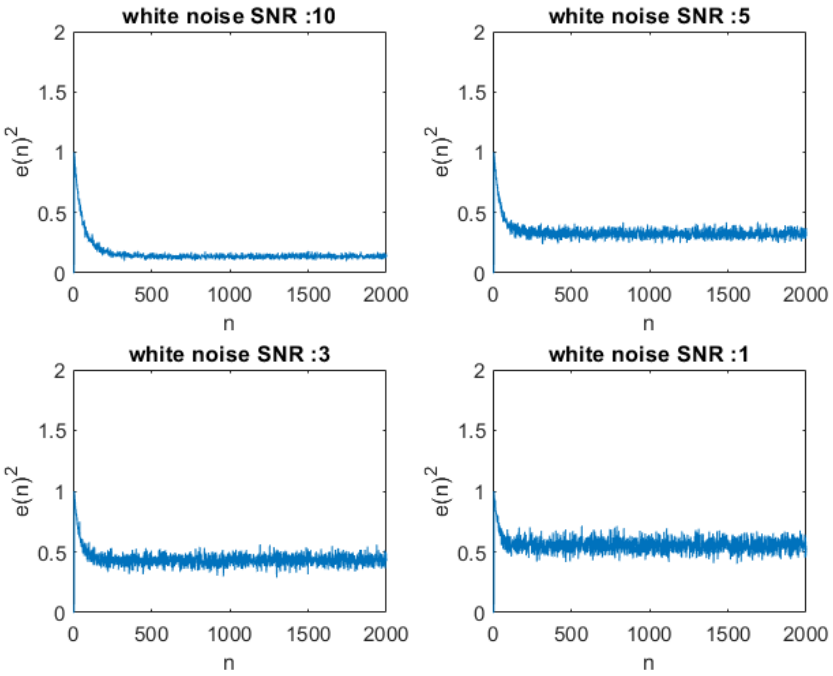

Figure 4: Different SNR - [10 , 5 , 3 , 1]

When white noise of varying SNR values is added to the original signal, it is observed that the learning curve of LMS does not converge to zero but oscillates around a specific value