Problem Set #2
ECE-595, Section II
Spring 2013, Adaptive Filtering
Date Assigned: 03/07/2013
Date Due: 03/19/2013

Background

In the previous homework assignment we compared various versions of the LMS algorithm and evaluated their performance in prediction of a second-order AR(2) process. In this exercise, we will compare the performance of the the recursive least-squares algorithms that were developed in the class.

Comparison of Algorithms

We will specifically look at three different versions of the RLS algorithm:

1. The exponentially weighted RLS algorithm described in chapter 9.0 of the textbook.
2. The adaptive memory RLS algorithm described in chapter 14, page 662 of the text book.
3. The variable forgetting factor RLS algorithm proposed by Paleoglu et. al., from IEEE Signal Processing Letters, Vol.15, pp. 597-600, 2008.

You will specifically compare the performance of the algorithms in stationary and slowly time-varying environments for different SNR scenarios by specifically looking at:

- Average tap-weight tracks, obtained by averaging over 150 experiments.
- MSE learning curves, obtained by averaging over 150 experiments.
- Conversion factor $\gamma[n]$ associated with the RLS iterations and the memory factor $\lambda[n]$.