

EE7600-2 Adaptive Filter Theory

Homework 4

Due on November 23, 2005, by 1:40 pm. (NO LATE SUBMISSION IS ALLOWED!)

Check Chapter Four in Haykin's text. Work on Problem 1, 2, 5, 6, 9, 14. Also work on the following simulation problem.

Simulation Problem

Download the ASCII data file "eegdata1.dat", which contains the electroencephalogram (EEG) data collected from the scalp of a patient with epilepsy. Build the linear forward predictors for 1-step, 10-step, 100-step predictions as follows:

- (a) Implement linear predictors using Wiener-Hopf Equations with a Matlab code.
- (b) Implement linear predictors using Levinson-Durbin Algorithm with a Matlab code.
- (c) Implement linear predictors using steepest-descent-search with a Matlab code.
- (d) Implement linear predictors using Newton's method with a Matlab code.
- (e) If the predictability is quantified as the signal-to-prediction-error ratio ρ such that

$$\rho = 10 \log_{10} \left[\frac{E\{u^2(n)\}}{E\{f^2(n)\}} \right],$$

plot the predictability curve versus the prediction step number.