Adaptive and Array Signal Processing/Processamento de Sinais Adaptativo

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Tutorial Questions/Lista de Exercícios - 7

1. Consider an echo cancellation problem as shown below

Echo path

where is an N x 1 input vector, d[i] is the desired signal, is the measurement noise, is the echo path to be identified that can be modelled as an FIR filter with N coefficients and is an adaptive filter with N coefficients used to identify . The system employs real Gaussian random variables with zero mean and a chosen variance to model , and , define the signal-to-noise ratio (SNR) in dB and echo return loss effect (ERLE) as shown in the Matlab programme on the website of the course.

Write a Matlab programme to simulate the mean-square error (MSE) and the ERLE curves that compare the performance of the following algorithms:

a) Affine projection algorithm.

b) DFT-LMS algorithm.

c) DCT-LMS algorithm.

d) KLT-LMS algorithm.

e) Reduced-rank LMS algorithm with eigendecomposition and with the Krylov subspace.