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% Filter the noisy signal with 8-point Running Average filter
% A noisy measurement has noise with a mean of zero and variance of 0.04
% 1. Cook Page 154 R=0.04; Actual value is 5.0. Compare Filtered signal
clc, clear all, clf
n = 1e3; x = linspace(0,100,n); % 10000 points
y=5*ones(size(x)); % Actual value without noise
var0 = 0.04; % Actual noise variance
% Standard Deviation is sqrt of Variance
yn = y + sqrt(var0)*randn(size(y)); % noisy function
est_var = var(yn);
figure(1),plot(x,yn,x,y),grid
title(['Actual variance: ' num2str(var0) ' / Estimated: ' num2str(
(est_var))]
maxyn = max(yn) % 5.5124
%
M=8 %windowSize = 8;
b=(1/M)*ones(1,M); % b_i = 0.125 = (1/8)
a = 1;
% Create filter * 8 Point
yfil = filter(b,a,yn);
est_var1 = var(yfil(9:1000)); % Delay 8 points for first estimate
figure(2),plot(x,yfil,x,y),grid
title(['Actual variance Unfiltered: ' num2str(var0) ' / Estimated: '
num2str(est_var1)])
maxyfil = max(yfil) % 5.2383

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