Delta Modulation

clc;

clear all;

close all;

%delta modulation = 1-bit differential pulse code modulation (DPCM)

predictor = [0 1]; % y(k)=x(k-1)

%partition = [-1:.1:.9];codebook = [-1:.1:1];

step=0.1; %SFs>=2pifA

partition = [0];codebook = [-1\*step step]; %DM quantizer

t = [0:pi/20:2\*pi];

x = 1.1\*sin(2\*pi\*0.1\*t); % Original signal, a sine wave

%t = [0:0.1:2\*pi];x = 4\*sin(t);

%x=exp(-1/3\*t);

%x = sawtooth(3\*t); % Original signal

% Quantize x(t) using DPCM.

encodedx = dpcmenco(x,codebook,partition,predictor);

% Try to recover x from the modulated signal.

decodedx = dpcmdeco(encodedx,codebook,predictor);

distor = sum((x-decodedx).^2)/length(x) % Mean square error

% plots

figure,subplot(2,2,1);plot(t,x);xlabel('time');title('original signal');

subplot(2,2,2);stairs(t,10\*codebook(encodedx+1),'--');xlabel('time');title('DM output');

subplot(2,2,3);plot(t,x);hold;stairs(t,decodedx);grid;xlabel('time');title('received signal');