EE5900 Simulation Assignment 1

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Contents

1 Code

```
clc;
clear all;
close all;

% Parameters
f0 = 10.0;
fs = 100.0;
fd = f0/fs;
ts = 1/fs;
t0 = 1;
toff = ts/2;

% Sample the input signal
t = 0:ts:(t0-ts);
t2 = 0:ts/2:(t0-ts/2);
x0 = sin(2*pi*fd*(t/ts));

% Convolve to obtain samples at offset ts/
h1 = sinc((t+toff)/ts);
x1 = conv(x0,h1);
x1 = x1(1:t0/ts);
x = zeros(1,length(x0)+length(x1));

% Put the two signals together
x(1:2:end) = x0;
x(2:2:end) = x1;

% Plot the output along with original
figure(1);
xa = sin(2*pi*fd*(t2/ts));
plot(t2,x,t2,xa);
legend('Interpolated Signal', 'Original Signal');
title('Results of Upsampler');

% Plot the error signal x - xa
figure(2);
err = x - xa;
plot(t2,err);
title('Error of Upsampler');
```

2 Output

The results of the upsampling and interpolation, in comparison to the original signal are shown in Figure 1.

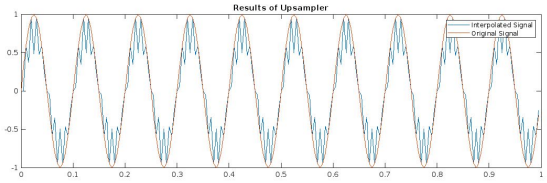

Fig. 1: Results of Upsampler.

The error between the two signals is shown in Figure 2.

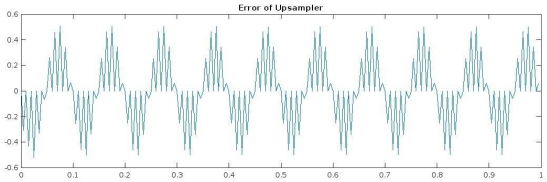

Fig. 2: Error of Upsampler.