AM:

fc = 200;

fm = 20;

fs = fc\*8;

t = 0:(1/fs):1;

Am = 7;

Ac = 10;

mt = Am.\*sin((2\*pi\*fm).\*t);

ct = Ac.\*sin((2\*pi\*fc).\*t);

% figure("Amplitute Modulation");

subplot(4,1,1);

plot(t, mt);

subplot(4,1,2);

plot(t,ct);

% st = (Ac+mt).\*sin((2\*pi\*fc).\*t);

st = ammod(mt,fc,fs,0,Am);

dt = demod(st,fc,fs,"am");

subplot(4,1,3);

plot(t,st)

subplot(4,1,4);

plot(t,dt);

FM:

fc = 200;

fm = 20;

fs = fc\*8;

t = 0:(1/fs):1;

Am = 7;

Ac = 10;

mt = Am.\*sin((2\*pi\*fm).\*t);

ct = Ac.\*sin((2\*pi\*fc).\*t);

% figure("Amplitute Modulation");

subplot(4,1,1);

plot(t, mt);

subplot(4,1,2);

plot(t,ct);

st = fmmod(mt, fc, fs, 15, 0);

dt = demod(st,fc,fs,"fm");

subplot(4,1,3);

plot(t,st)

subplot(4,1,4);

plot(t,dt);

PCM:

fm = 20;

fs = fm\*5;

Am = 5;

% Make time for non sampled signal

t = 0:(1/(20\*fs)):1;

mt = Am.\*sin((2\*pi\*fm).\*t)

subplot(4,1,1);

plot(t,mt)

% sampling the message signal

t = 0:(1/fs):1;

dt = Am.\*sin((2\*pi\*fm).\*t) + Am;

% Quantization levels

level = 8;

subplot(4,1,2);

plot(t, dt)

dt = dt + (Am/(2\*level));

dt = dt - mod(dt,(Am/level));

subplot(4,1,3);

stem(t, dt);

% Encode the signal

dt = dt/1.25;

st = dt.\*1.25 + Am;

subplot(4,1,4);

plot(st)

PWM:

close all

clc

fm = 30;

fc = 100;

fs = 8\*fc;

t = 0:(1/fs):1;

ct = sawtooth((2\*pi\*fc).\*t);

subplot(4,1,1);

plot(t,ct);

mt = sin((2\*pi\*fm).\*t);

subplot(4,1,2);

plot(t, mt);

st = zeros(1,length(t));

for i = 1:length(mt)

if(ct(i) > mt(i))

st(i) = 1;

end

end

% st = modulate(mt,fc,fs,"pwm");

% st = st + 0.5;

subplot(4,1,3);

plot(t,st);

dt = -1.\*lowpass(st,20,fs) + 1;

subplot(4,1,4);

plot(t,dt);

ASK:

close all

clear

fc = 100;

fs = 8\*fc;

t = 0:(1/fs):1;

ct = sin((2\*pi\*fc).\*t);

subplot(4,1,1);

plot(t,ct);

mt = zeros(1,length(ct));

mt(100:150) = 1;

mt(230:270) = 1;

mt(400:550) = 1;

mt(650:720) = 1;

mt = round(mt);

subplot(4,1,2);

plot(t,mt);

st = mt.\*ct;

subplot(4,1,3);

plot(t,st);

rt = abs(st);

rt = lowpass(rt, 20, fs);

subplot(4,1,4);

plot(t,rt);

PSK:

close all

clc

fc = 100;

fs = 8\*fc;

t = 0:(1/fs):1;

ct = sin((2\*pi\*fc).\*t);

subplot(4,1,1);

plot(t,ct);

mt = zeros(1,length(ct));

mt(100:150) = 1;

mt(230:270) = 1;

mt(400:550) = 1;

mt(650:720) = 1;

mt = round(mt);

subplot(4,1,2);

plot(t, mt);

temp = zeros(1,length(ct));

for i = 2:length(mt)

if(mt(i-1) == mt(i))

continue

else

temp(i) = 1;

end

end

st = sin((2\*pi\*fc).\*t);

ph = zeros(1,1);

for i = 1:length(temp)

if(temp(i) == 1)

ph = ph + pi;

disp(i);

end

st(i) = sin((2\*pi\*fc).\*t(i) + ph);

end

subplot(4,1,3);

plot(t, st);

PPM:

close all

clc

fm = 30;

fc = 100;

fs = 8\*fc;

t = 0:(1/fs):1;

ct = sawtooth((2\*pi\*fc).\*t);

subplot(5,1,1);

plot(t,ct);

mt = sin((2\*pi\*fm).\*t);

subplot(5,1,2);

plot(t, mt);

st = zeros(1,length(t));

for i = 1:length(mt)

if(ct(i) > mt(i))

st(i) = 1;

end

end

subplot(5,1,3);

plot(t,st);

encodedSig = zeros(1,length(st));

for i = 2:length(st)-10

if(st(i) == 0 && st(i-1) ~= 0)

encodedSig(i:i+2) = 1;

end

end

subplot(5,1,4);

plot(t,encodedSig);

dt = lowpass(encodedSig,5,fs);

subplot(5,1,5);

plot(t,dt);

PAM:

close all

clear

fc = 100;

fm = 40;

fs = 16\*fc;

t = 0:1/fs:1;

mt = sin((2\*pi\*fm).\*t);

subplot(4,1,1);

plot(t,mt);

ct = square((2\*pi\*4\*fc).\*t);

ct = (ct + 1)/2;

subplot(4,1,2);

plot(t,ct);

st = mt.\*ct;

subplot(4,1,3);

plot(t,st);

dt = lowpass(st,1,50);

subplot(4,1,4);

plot(t,dt);

FSK:

close all

clear

fc = 100;

fs = 20\*fc;

t = 0:(1/fs):1;

ct = sin((2\*pi\*fc).\*t);

subplot(4,1,1);

plot(t,ct);

mt = zeros(1,length(ct));

mt(100:150) = 1;

mt(230:270) = 1;

mt(400:550) = 1;

mt(650:720) = 1;

mt(1000:1200) = 1;

mt(1750:1900) = 1;

subplot(4,1,2);

plot(t,mt);

st = zeros(1,length(mt));

for i = 1:length(t)

if mt(i) == 0

st(i) = sin((2\*pi\*fc).\*t(i));

else

st(i) = sin((2\*pi\*5\*fc).\*t(i));

end

end

subplot(4,1,3);

plot(t,st);

dt = bandpass(st,[4\*fc,6\*fc],fs);

dt = round(lowpass(abs(dt),20,fs)+0.3);

subplot(4,1,4);

plot(t,dt);