clear all

pkg load communications

%

function [fidnoi,fid] = gen\_fid(N,res\_f,sw,P) % N - length of the FID, res\_f - resonance freqeuncyof the observed signal, sw - spectral width; P - percentage of left out values of the FID

n=(0:N-1);

dt=1.0/sw;

t=(0:dt:(N-1)\*dt);

ny=res\_f\*t(length(t));

R2=1.26/n(length(n));

f\_real=cos(2\*pi\*ny\*n/N).\*exp(-R2\*n);

f\_imag=sin(2\*pi\*ny\*n/N).\*exp(-R2\*n);

S = gen\_scheme\_unif(N,P);

%S = gen\_scheme\_exp(N,P);

%S = gen\_scheme\_gauss(N,P);

%S = gen\_scheme\_cos2(N,P);

%S = gen\_scheme\_poiss(N,P);

%S = gen\_scheme\_poiss2(N,P);

fidd=awgn((f\_real+i\*f\_imag),2,'measured');

fid=f\_real.\*S+i\*f\_imag.\*S;

fidnoi=real(fidd).\*S+i\*imag(fidd).\*S;

end

function [C,lw] = check\_res(fq,ft)

ma=max(real(ft));

left=0;

right=0;

tmp=0;

ft\_rev=ft(length(ft):-1:1);

m=length(fq);

l=1;

while (ft(l)<(ma/2))

left=l;

l++;

endwhile

l=1;

while (ft\_rev(l)<(ma/2))

right=l;

l++;

endwhile

right=length(ft)-right;

lw = fq(right)-fq(left);

if (lw >= 3.66)

C = "pass";

else

C = "fail";

endif

end

function [f,FTnonoi,lw] = fotr(N,res\_f,sw,P) % N - length of the FID, res\_f - resonance freqeuncyof the observed signal, sw - spectral width; P - percentage of left out values of the FID

C = "fail";

while (C == "fail")

[fidnoi,fid] = gen\_fid(N,res\_f,sw,P);

fnoi\_zf=[];

fnoi\_zf=[fidnoi zeros(1,15\*length(fidnoi))];

f\_zf=[];

f\_zf=[fid zeros(1,15\*length(fid))];

f=(-sw/2:sw/(length(fnoi\_zf)-1):sw/2);

FT=real(fftshift(fft(fnoi\_zf)));

FTnonoi=real(fftshift(fft(f\_zf)));

y=1;

while (y<length(f))

if (f(y)<(res\_f-25.0))

left=y;

elseif (f(y)<(res\_f+25.0))

right=y;

else

break;

endif

y++;

endwhile

noise=[FTnonoi(1:left) FTnonoi(right:length(f))];

offset=mean(noise);

FTnonoi=FTnonoi-offset;

[C,lw] = check\_res(f,FTnonoi);

endwhile

end

dens = 10;

res\_frq=350.0;

v1550=[];

v1450=[];

v1350=[];

v1250=[];

v1150=[];

v1050=[];

v950=[];

v850=[];

v750=[];

v650=[];

v550=[];

v450=[];

v350=[];

v250=[];

v150=[];

for z=1:100

noi=[];

[f,FT,lw] = fotr(512,res\_frq,2500.0,dens);

v1550=[v1550 std(FT(1:328))];

v1450=[v1450 std(FT(329:656))];

v1350=[v1350 std(FT(657:983))];

v1250=[v1250 std(FT(984:1311))];

v1150=[v1150 std(FT(1312:1639))];

v1050=[v1050 std(FT(1640:1966))];

v950=[v950 std(FT(1967:2294))];

v850=[v850 std(FT(2295:2622))];

v750=[v750 std(FT(2623:2949))];

v650=[v650 std(FT(2950:3277))];

v550=[v550 std(FT(3278:3605))];

v450=[v450 std(FT(3606:3932))];

v350=[v350 std(FT(3933:4260))];

v250=[v250 std(FT(4261:4587))];

v150=[v150 std(FT(4588:4915))];

endfor

f\_dist=[1550 mean(v1550) std(v1550); 1450 mean(v1450) std(v1450); 1350 mean(v1350) std(v1350); 1250 mean(v1250) std(v1250); 1150 mean(v1150) std(v1150); 1050 mean(v1050) std(v1050); 950 mean(v950) std(v950); 850 mean(v850) std(v850); 750 mean(v750) std(v750); 650 mean(v650) std(v650); 550 mean(v550) std(v550); 450 mean(v450) std(v450); 350 mean(v350) std(v350); 250 mean(v250) std(v250); 150 mean(v150) std(v150);];

save("-text", strcat("noiDist.dat"), "f\_dist");