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%Michael Benker
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%9/25/2019
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```
%Data Acquisition for RCS/ISAR
```

```
A = load('scope_2_990M_995M.dat');
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```
B = load('scope_3_1000M_995M.dat');
```

```
Tim1 = A(:,1);
```

```
Tim2 = B(:,1);
```

```
Chan1 = A(:,2); %I(t)A
```

```
Chan1B = B(:,2); %I(t)B
```

```
Chan2 = A(:,3); %Q(t)A
```

```
Chan2B = B(:,3); %Q(t)B
```

```
w0 = 2*pi*1e7;
```

```
y = size(Tim1,1); %10000
```

```
fs1 = size(Tim1,1)/(max(Tim1)-min(Tim1))
```

```
fs2 = size(Tim2,1)/(max(Tim2)-min(Tim2))
```

```
%f = [0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 11000 12000];
```

```
artificial = Chan1.*cos(w0.*Tim1)+Chan2.*sin(w0.*Tim1);
```

```
artificialB = Chan1B.*cos(w0.*Tim2)+Chan2B.*sin(w0.*Tim2);
```

```
figure(1)
```

```
subplot(3,2,1)
```

```
plot(Tim1,Chan1);
```

```
%xlim([-5 55])
```

```
%ylim([-0.025 0.025])
```

```
xlabel('Time (s)')
```

```
ylabel('Amplitude (V)')
```

```
title('Channel 1: I(t)')
```

```
subplot(3,2,2)
```

```
plot(Tim2,Chan1B);
```

```
%xlim([-5 55])
```

```
%ylim([-0.025 0.025])
```

```
xlabel('Time (s)')
```

```
ylabel('Amplitude (V)')
```

```
title('Channel 1: I(t)')
```

```
subplot(3,2,3)
```

```
plot(Tim1,Chan2);
```

```
%xlim([-5 55])
```

```
%ylim([-0.025 0.025])
```

```
xlabel('Time (s)')
```

```
ylabel('Amplitude (V)')
```

```
title('Channel 2 - Q(t)')
```

```
subplot(3,2,4)
```

```
plot(Tim2,Chan2B);
```

```
%xlim([-5 55])
```

```
%ylim([-0.025 0.025])
```

```

xlabel('Time (s)')
ylabel('Amplitude (V)')
title('Channel 2 - Q(t)')

subplot(3,2,5)
plot(Tim1, artificial);
%xlim([-5 55])
%ylim([-0.025 0.025])
xlabel('Time (s)')
ylabel('Amplitude (V)')
title('artificial = I(t)cos(w0*t)+Q(t)sin(w0*t)')

subplot(3,2,6)
plot(Tim2, artificialB);
%xlim([-5 55])
%ylim([-0.025 0.025])
xlabel('Time (s)')
ylabel('Amplitude (V)')
title('artificial = I(t)cos(w0*t)+Q(t)sin(w0*t)')
sgtitle('Left: RF: 990MHz, LO = 995MHz, Right: RF: 1000MHz, LO = 995MHz')

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
figure(2)
subplot(3,2,1)
%pwelch(Chan1);
[C1,fc1] = pwelch(Chan1, 1000,25,[],fs1);
plot(fc1,10*log10(C1));
xlabel('Frequency')
ylabel('Amplitude')
title('Channel 1')
xlim([-5 25000000])

subplot(3,2,2)
[C1B,fc1B] = pwelch(Chan1B, 1000,25,[],fs2);
plot(fc1B,10*log10(C1B));
xlabel('Frequency')
ylabel('Amplitude')
title('Channel 1')
xlim([-5 25000000])

subplot(3,2,3)
%pwelch(Chan2);
[C2,fc2] = pwelch(Chan2, 1000,25,[],fs1);
plot(fc2,10*log10(C2));
xlabel('Frequency')
ylabel('Amplitude')
title('Channel 2')
xlim([-5 25000000])

subplot(3,2,4)
%periodogram(Chan2B,length(Tim2));

```

```

%pwelch(Chan2B);
[C2B,fc2B] = pwelch(Chan2B, 1000,25,[],fs2);
plot(fc2B,10*log10(C2B));
%plot(f,10*log10(pxx))
xlabel('Frequency')
ylabel('Amplitude')
title('Channel 2')
xlim([-5 25000000])

subplot(3,2,5)
%[AP,s] = periodogram(artificial);
%plot(pwelch(artificial, [],[],[],fs1));
[artA,fA] = pwelch(artificial, 1000,25,[],fs1);
plot(fA,10*log10(artA));
xlabel('Frequency')
ylabel('Amplitude')
title('artificial')
xlim([-5 25000000])

subplot(3,2,6)
%plot(10*log10(pwelch(artificialB, y)));
[artB,fB] = pwelch(artificialB, 1000,25,[],fs2);
plot(fB,10*log10(artB));
%plot(pwelch(artificialB))
xlabel('Frequency')
ylabel('Amplitude')
title('artificial')
sgtitle('Left: RF: 990MHZ, LO = 995MHZ, Right: RF: 1000MHZ, LO = 995MHZ')
xlim([-5 25000000])

%periodogram(artificial)

```

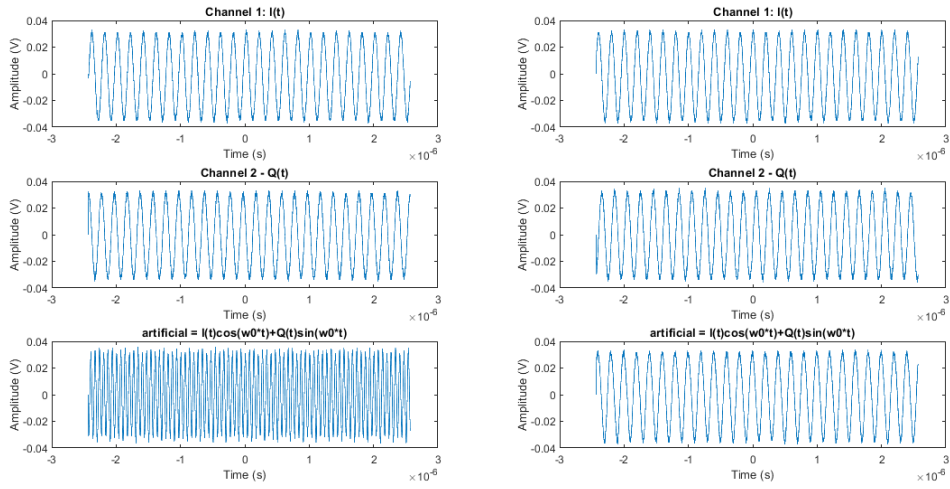
fs1 =

2.0002e+09

fs2 =

2.0002e+09

Left: RF: 990MHz, LO = 995MHz, Right: RF: 1000MHz, LO = 995MHz



Left: RF: 990MHz, LO = 995MHz, Right: RF: 1000MHz, LO = 995MHz

