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## Case study 3: Circuits as Resonators, Sensors, and Filters

ESE 105

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```
clear;  
close all;
```

```
Fs = 192000;    % Sampling frequency, Hz
```

### Task 1: Tuning fork

```
Fs = 192000;    % Sampling frequency, Hz  
Vpulse = zeros(length(0:(1/Fs):5),1);    % 5-second duration  
Vpulse(2) = 1;
```

```
Vringing = myResonatorCircuit(Vpulse,1/Fs);  
soundsc(Vringing,Fs);
```

### Task 2: Audio sensor

```
Fs = 192000;  
load('MarsHelicopter_noisy.mat');  
% set sampling interval to match sampling rate of the audio signal  
h = 1/Fs;
```

```
% compute signal output from circuit  
VsoundFiltered = mySensorCircuit(Vsound,h);
```

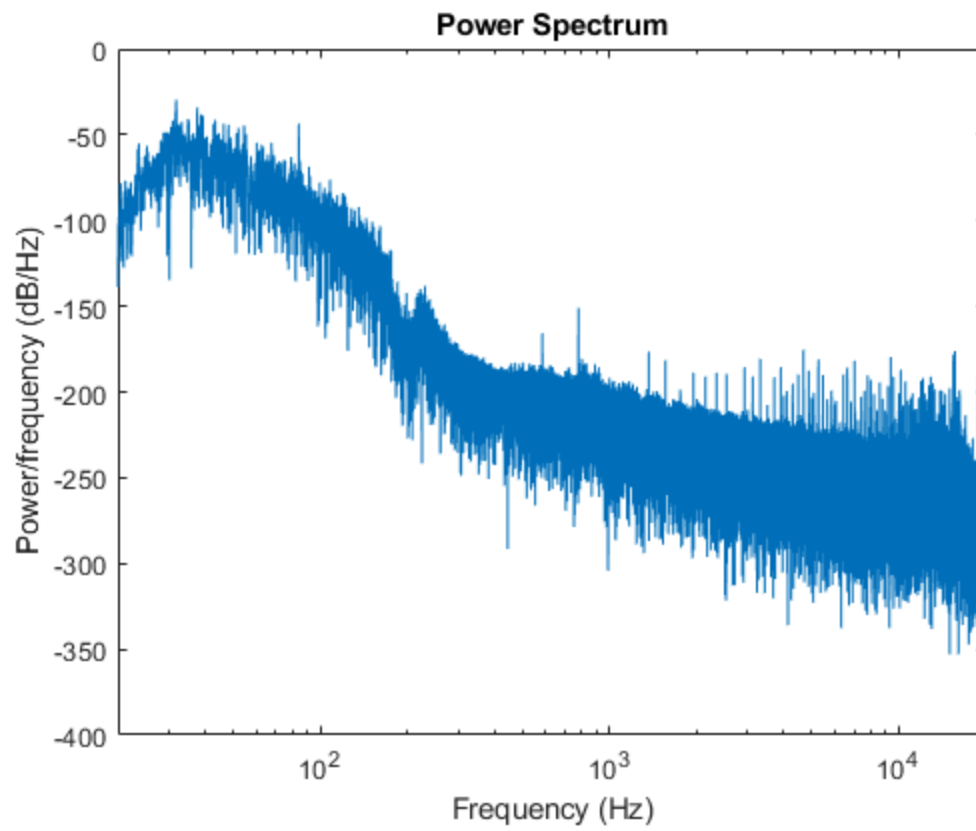
```
% compare power spectra  
plotPowerSpectrum(Vsound,Fs);  
plotPowerSpectrum(VsoundFiltered,Fs);
```

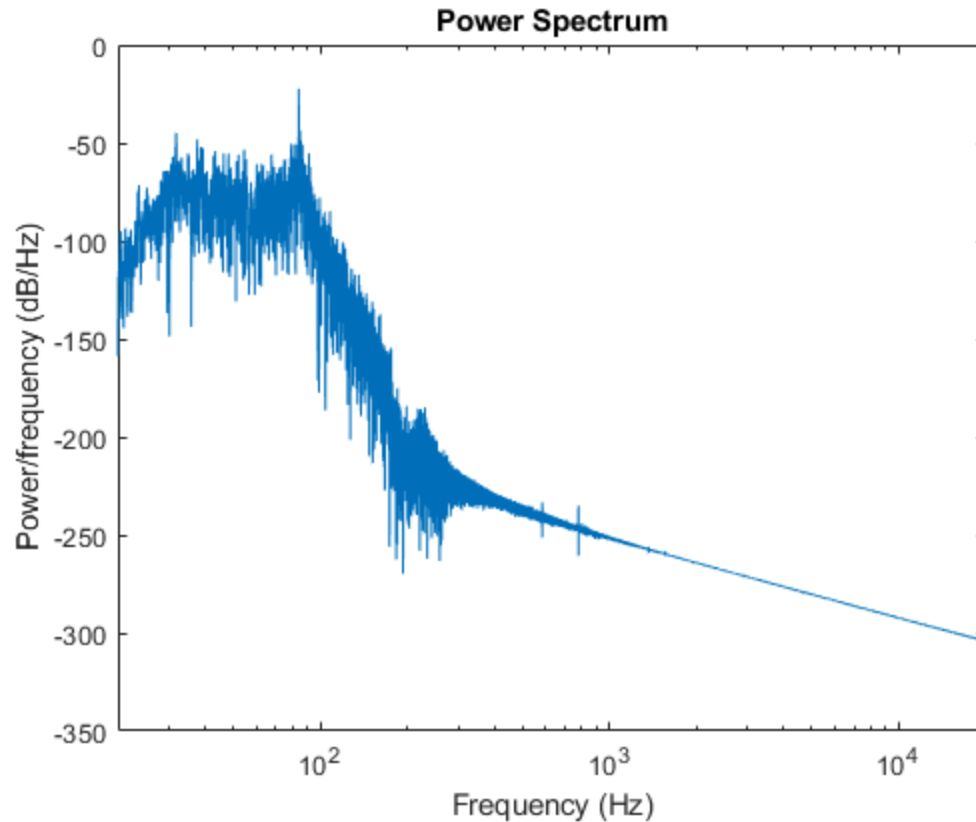
```
% play original sound  
playSound(Vsound,Fs);
```

```
% play sound after circuit filter  
playSound(VsoundFiltered,Fs);
```

---

```
%filename = 'filterheli.wav';  
%audiowrite(filename,VsoundFiltered,Fs);
```

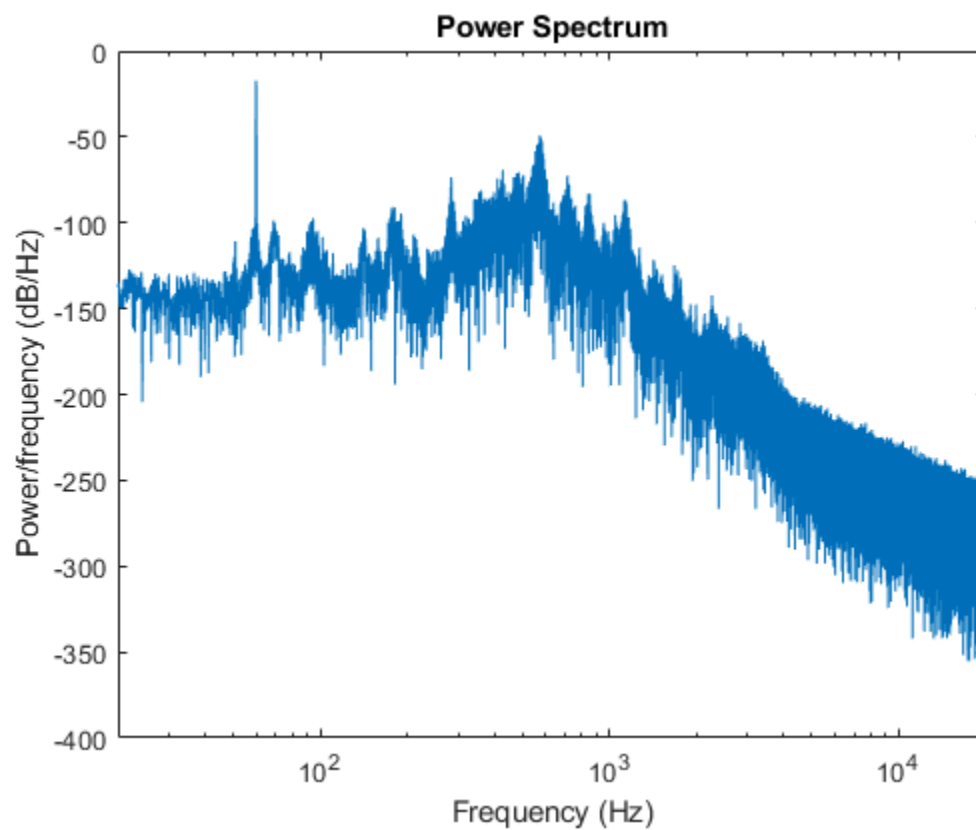
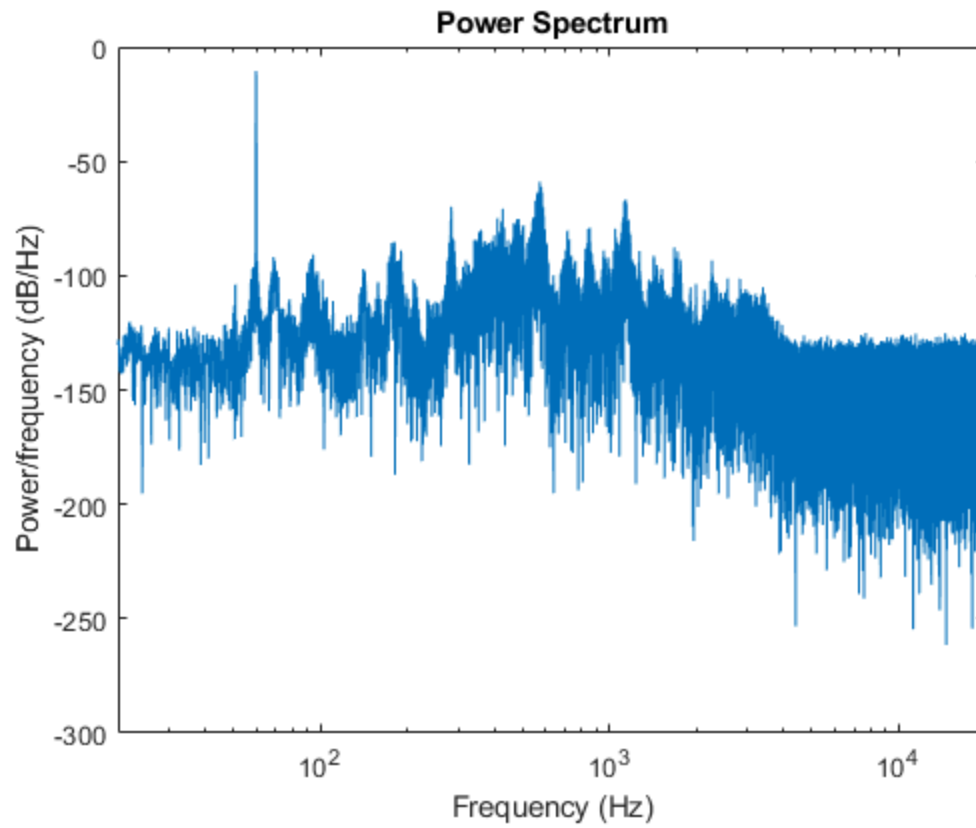




## Task 3: Music filter

move frequency to music ranges

```
% load('handel.mat');  
load('noisyhandel.mat');  
  
% set sampling interval to match sampling rate of the audio signal  
h = 1/Fs;  
  
% compute signal output from circuit  
VsoundFiltered = myFilterCircuit(Vsound,h);  
  
% compare power spectra  
plotPowerSpectrum(Vsound,Fs);  
plotPowerSpectrum(VsoundFiltered,Fs);  
  
% play original sound  
%playSound(Vsound,Fs);  
  
% play sound after circuit filter  
playSound(VsoundFiltered,Fs);  
  
%filename = 'filter.wav';  
%audiowrite(filename,VsoundFiltered,Fs);
```



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