```
% S_Pixie_filter.m
%
% Computes and plots the frequency response of the analog RF filter used
% in the S Pixie
%
% H(s) = NUM/DEN
%
% NUM = b4*s^4 + b3*s^3 + b2*s^2 + b1*s
% DEN = a7*s^7 + a6*s^6 + a5*s^5 + a4*s^4 + a3*s^3 + a2*s^2 + a1*s + a0
%
% b = [b4 b3 b2 b1 0]
% a = [a7 a6 a5 a4 a3 a2 a1 a0]
%
% 1 jan 2019
% gj lemay
%
Ri = 100;
C1 = 10e-9;
RL = 50;
C = 470e-12;
L = 1e-6;

w1 = 1/(Ri*C);
w2 = 1/(Ri*C1);
w3 = 1/(RL*C);
w0 = 1/sqrt(L*C)

f1 = w1/(2*pi)
f2 = w2/(2*pi)
f3 = w3/(2*pi)
f0 = w0/(2*pi)

b4 = w1*w0^2/w3;
b3 = w1^2*w0^2/w3;
b2 = 2*w1*w0^4/w3;
b1 = w1^2*w0^4/w3;

a7 = 1/w3;
a6 = 2*w1/w3 + 1;
a5 = 3*w0^2/w3 +2*w1 + w1^2/w3;
a4 = 5*w0^2*w1/w3 + 2*w0^2 + w1^2;
a3 = w0^2*w2 + 2*w0^2*w1^2/w3 + 3*w1*w0^2 + 2*w0^4/w3;
a2 = w1*w2*w0^2 + 3*w0^4*w1/w3 + w1^2*w0^2;
a1 = w0^4*w2 + w0^4*w1/w3 + w1*w0^4;
a0 = w1*w2*w0^4;

b = [b4 b3 b2 b1 0];
a = [a7 a6 a5 a4 a3 a2 a1 a0];

w = logspace(5,8);
h = freqs(b,a,w);

plot(w/(2*pi),20*log10(abs(h)))
title('Frequency Response of Loaded Filter (RL=50, Ri=100)')
xlabel('Frequency [Hz]');ylabel('Magnitude [dB]')
```