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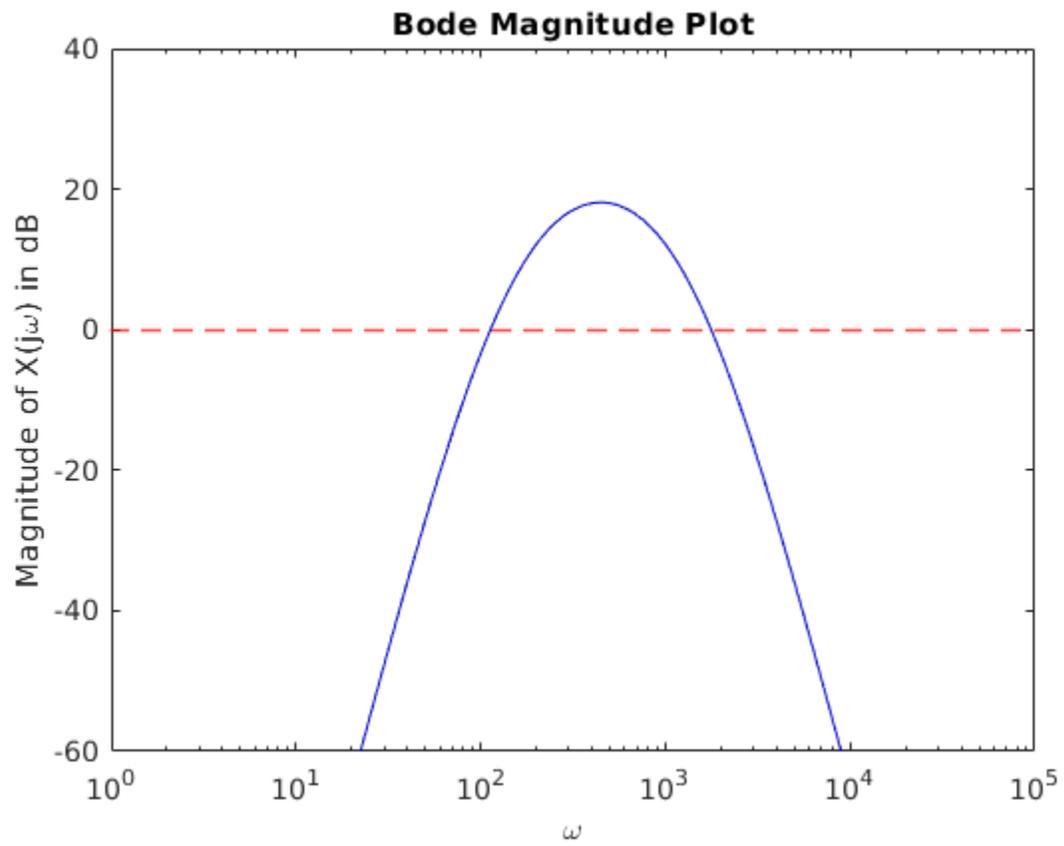
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% Daniel Pacheco
%
% Matlab 5
clear;
clc;
% 1
w = logspace(0, 5, 500);
A = 5;
fprintf("A is:%d\n",A);
B = -2;
fprintf("B is:%d\n",B);
C = -3;
fprintf("C is:%d\n",C);
D = -3;
fprintf("D is:%d\n",D);
E = -2;
fprintf("E is:%d\n",E);
syms m
eqn = 20*log10(abs(m * (1i*500)^A*(100 + 1i*500)^B * (200 + 1i*500)^C * (1000
+ 1i*500)^D * (2000 + 1i*500)^E)) == 18;
K = double(solve(eqn,m, 'IgnoreAnalyticConstraints',true));
fprintf("K is:%G\n",K);
Hjw = K * (1i*w).^A .* (100 + 1i*w).^B .* (200 + 1i*w).^C .* (1000 +
1i*w).^D .* (2000 + 1i*w).^E;
hmag = double(20*log10(abs(Hjw)));
figure();
semilogx(w, hmag, 'LineStyle', '-', 'Color', [0, 0, 0.8]);
yline(0, 'r--', 'LineWidth', 1);
xlabel('\omega');
ylabel('Magnitude of X(j\omega) in dB');
title('Bode Magnitude Plot');
xlim([min(w) max(w)]);
ylim([-60 40]);
yticks(-100:20:40);
%2
idx_6dB = find(hmag <= -6, 1, 'first');
idx_40dB = find(hmag >= -40, 1, 'first');
freq_6dB = w(idx_6dB);
freq_40dB = w(idx_40dB);
roll_off_ratio = (34) / (log2(freq_40dB/(2*pi)) - log2(freq_6dB/(2*pi)));
fprintf('Roll-off ratio is approximately: %.2f dB/octave\n', roll_off_ratio);

A is:5
B is:-2
C is:-3
D is:-3
E is:-2
K is:6.13019E+16
Roll-off ratio is approximately: 6.55 dB/octave

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