

7 月 16 日前，以实验报告形式提交，要附上详细的分析、结果图和源代码。软件工程专业发到 lizhl9@mail2.sysu.edu.cn，信息安全、国防生、智能科学专业发到 yuht4@outlook.com。文件命名：学号_姓名。

Design a lowpass filter. The specifications are given as follows:

stopband edge: 5 rad/sec

passband edge: 3 rad/sec

maximum passband attenuation: 0.3dB

minimum stopbandband attenuation: 40dB

sampling frequency: 15 rad/sec

- (a). Use each of the following approximation for the design: Butterworth approximation, Chebyshev approximation, Elliptic approximation. Plot the gain response of the designed filters for each case. Give the main design steps. Comment on your results.
- (b). Use each of the following windows for the design: Hamming, Hann, Blackman, and Kaiser. Show the ideal impulse response, the actual impulse response, and plot the gain response of the designed filters for each case. Give the main design steps. Comment on your results. Do not use the function `fir1` of Matlab.
- (c). Repeat (b) except for the ideal impulse response, by using the function `fir1` of Matlab. Compare results of (b) with those of (c).