# ECE 641 Project Presentation

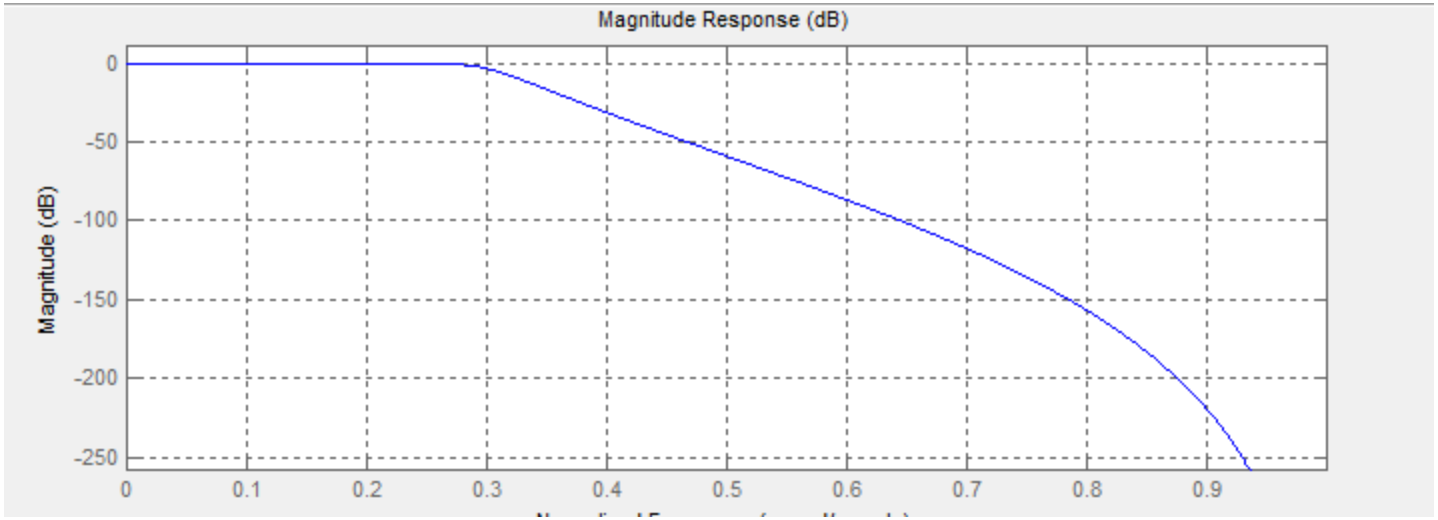
10-order Butterworth IIR filter

Chunyi Kang

# Butterworth filter

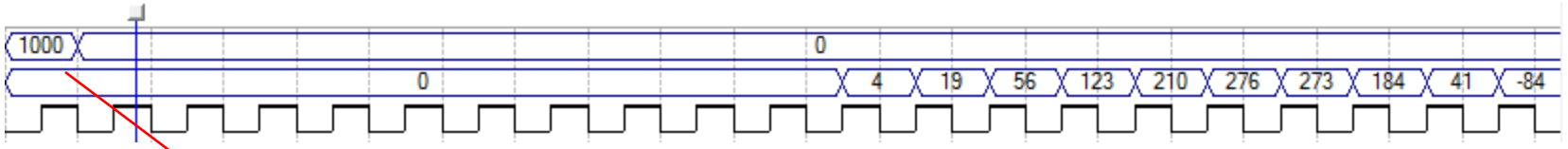
- Low ripple at passband, which means  signal very flat at passband. (advantage)
- Relatively low roll-off, which the slope is around 20dB/decade. (disadvantage)
- However we can achieve high steep by adding the orders of filter, that why I choose 10-order Butterworth filter

# Lowpass filter

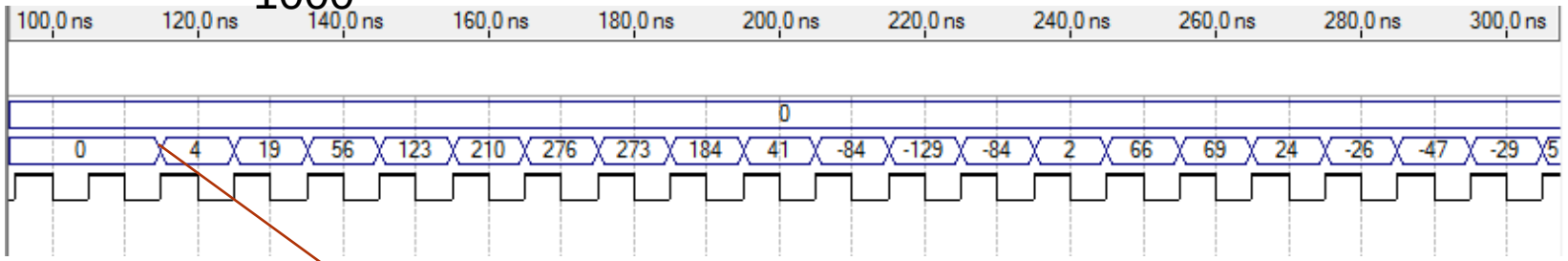



Lowpass filter (10 order butterworth)
Fs (sample frequency) = 2000 Hz
Fp (passband frequency = 500 Hz
Slop = 20 dB/decade

# Quartus Simulation

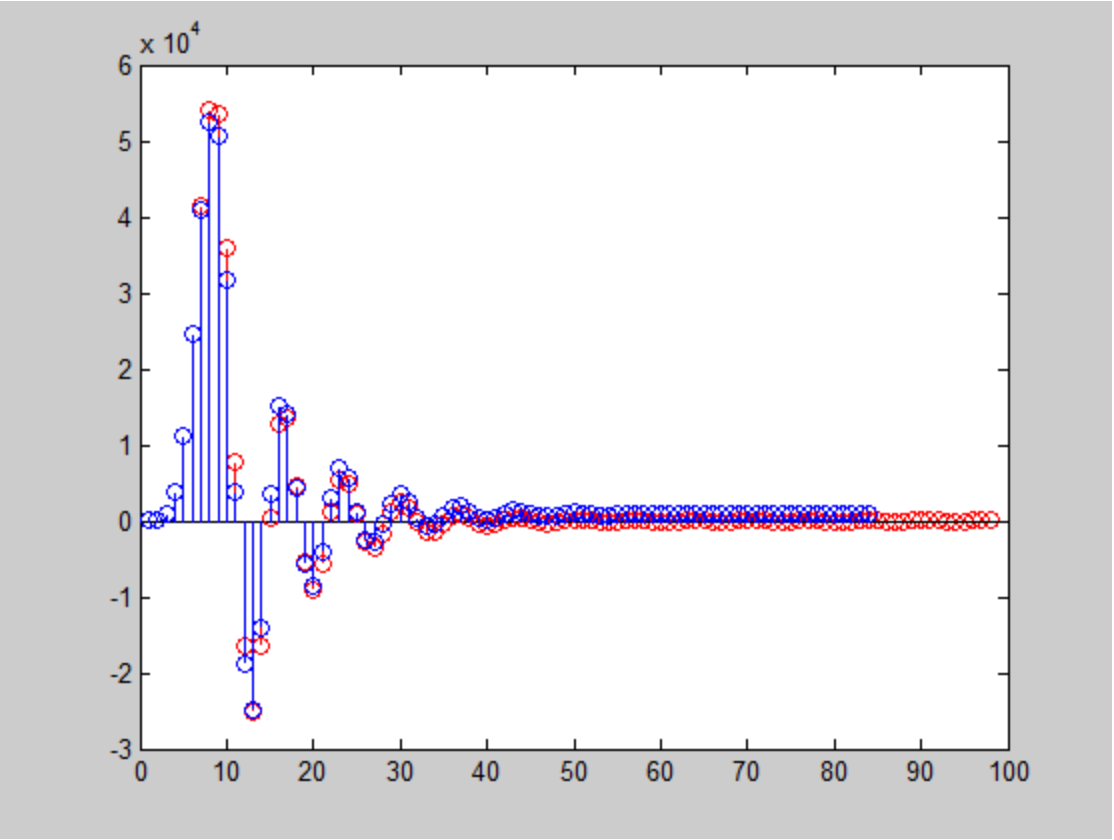



Input equals 1000




After 10 clock period, output have values

# Matlab simulation



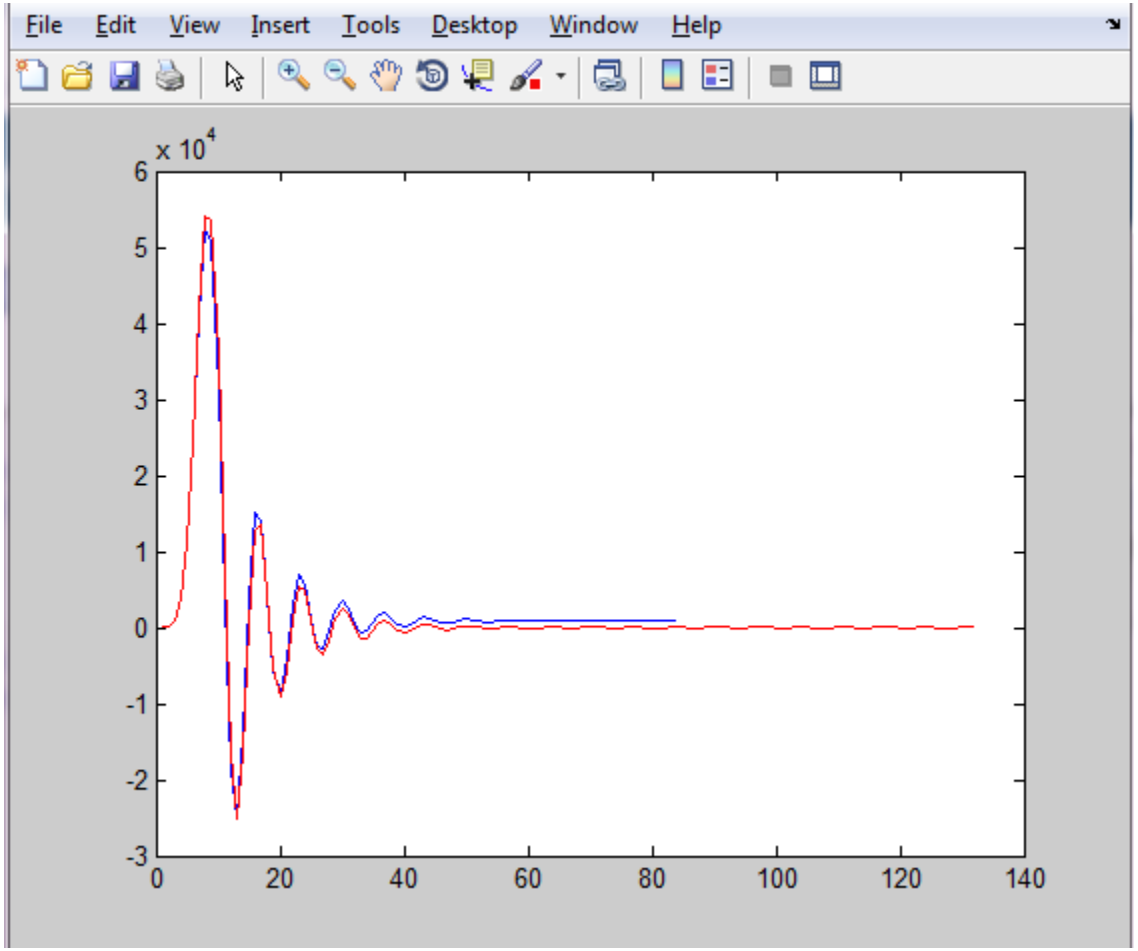

Discrete points comparing

Use matlab simulating filter response, in which input is a impulse function

Compared the results generated by Quartus simulation with results from matlab

Red ------- Quartus result
Blue-------- Matlab result

# Matlab simulation

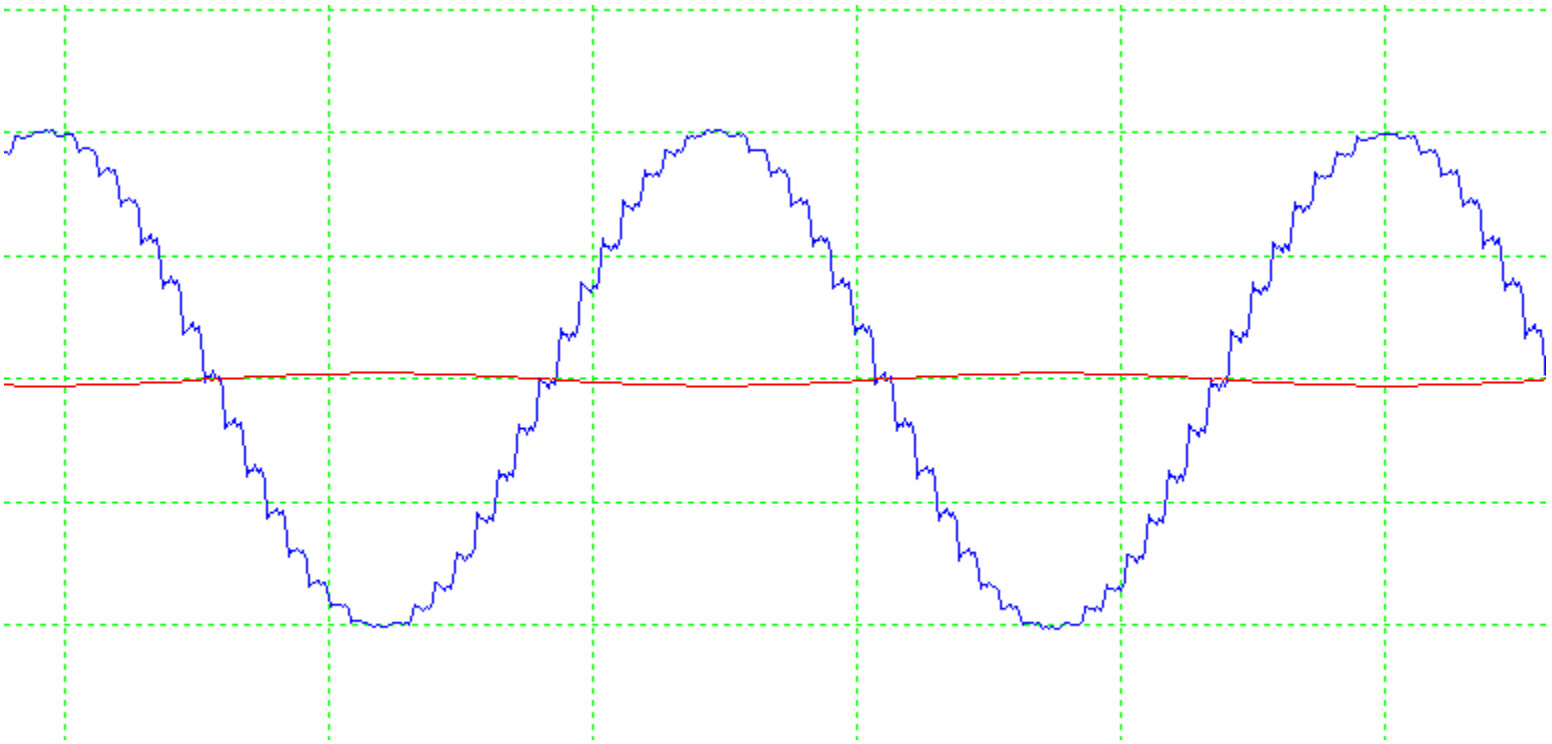



Solid line comparing

Blue line ---- Quartus Simluation result

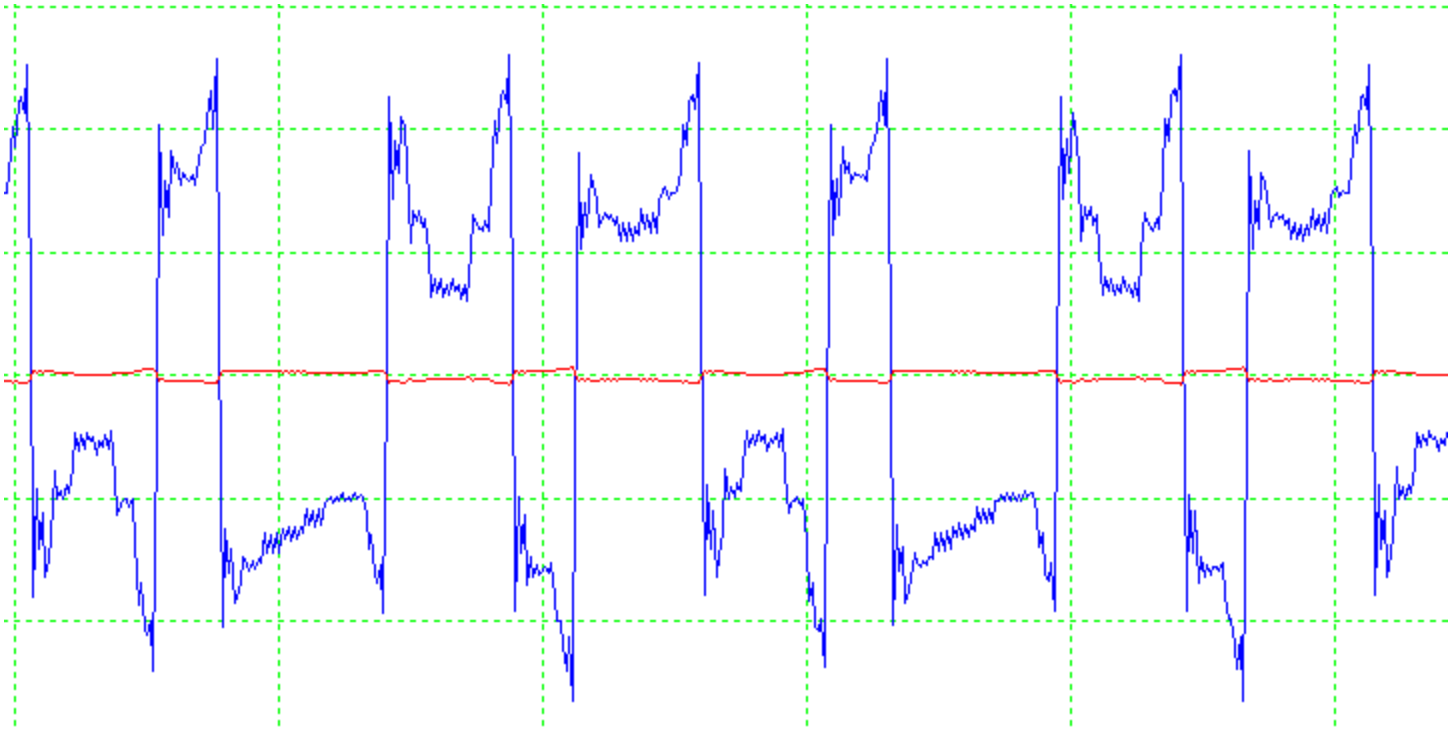
Red line ---- Matlab Simulation result

# Oscilloscope result

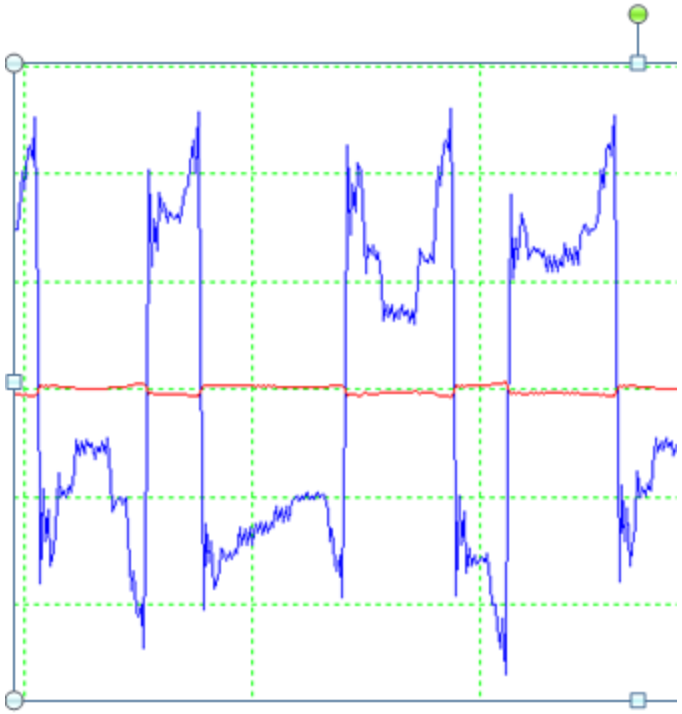


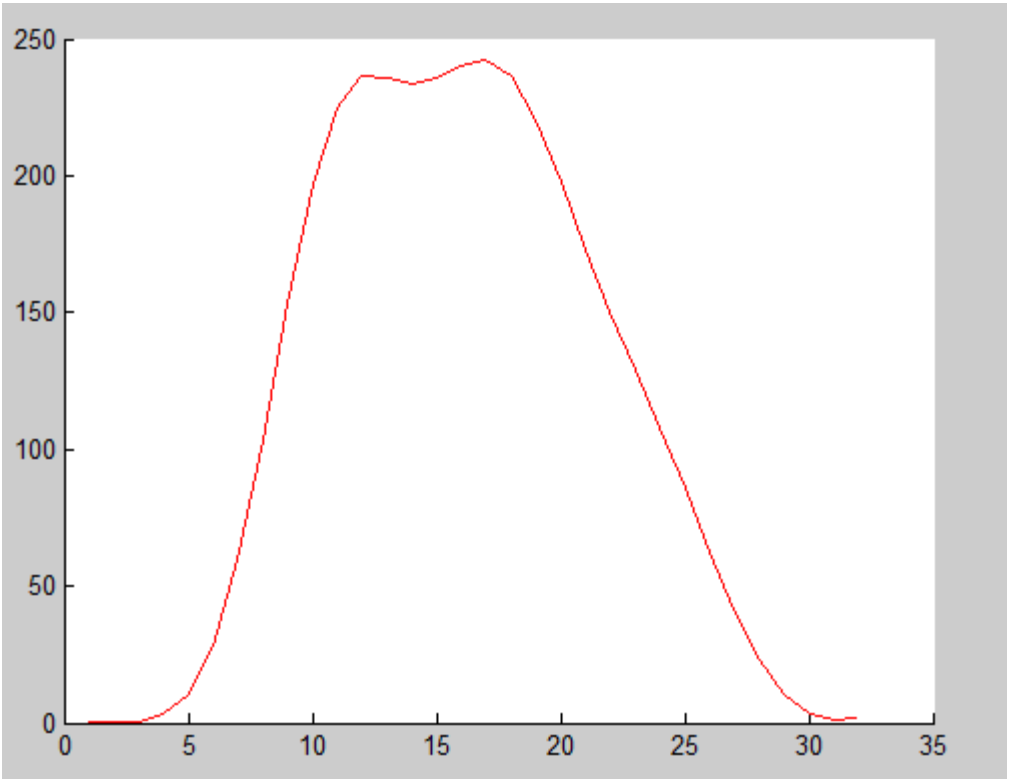
Original Sinusoid signal

# Sinusoid wave after filtering



# Compared with matlab simulation

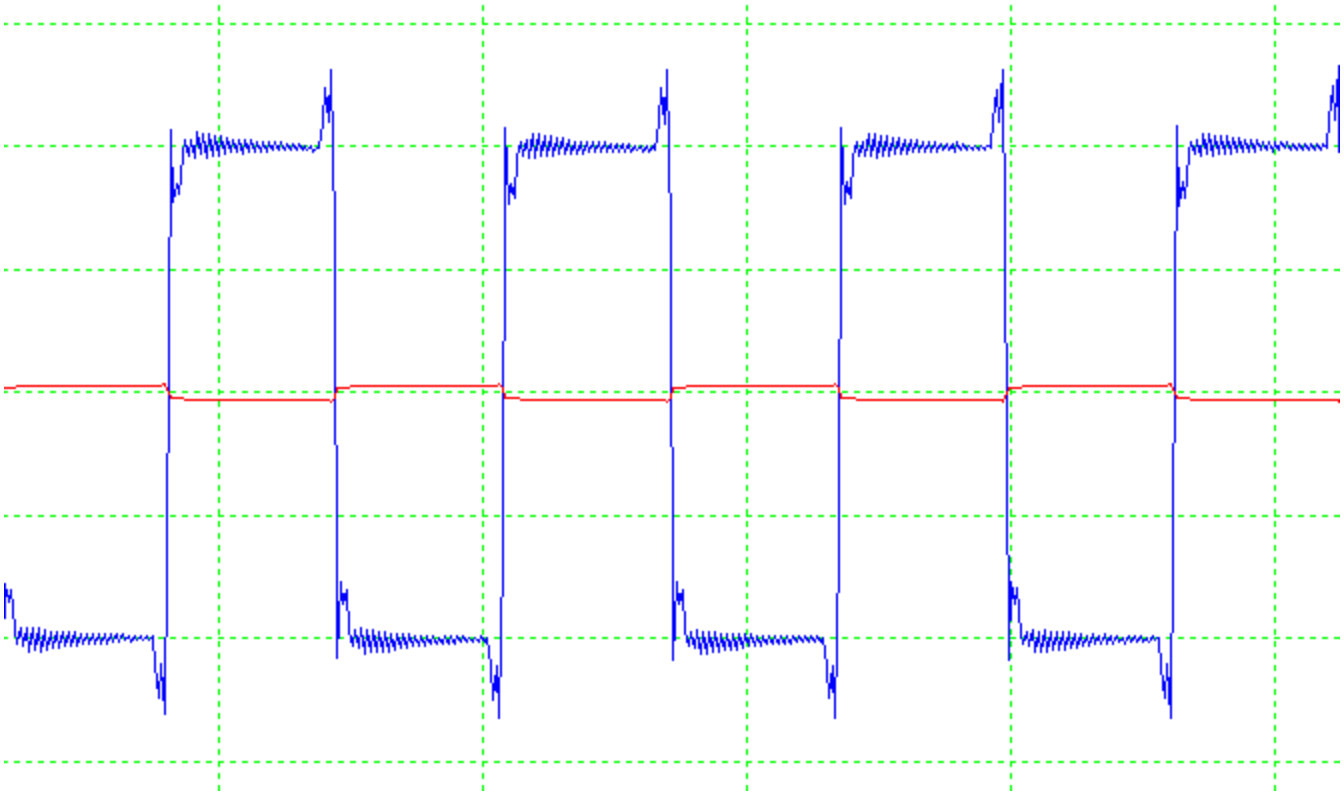





Results from visual oscilloscpoe

Resulut from Matlab

# Original rectangular signal



# Rectangular signal after filtering

