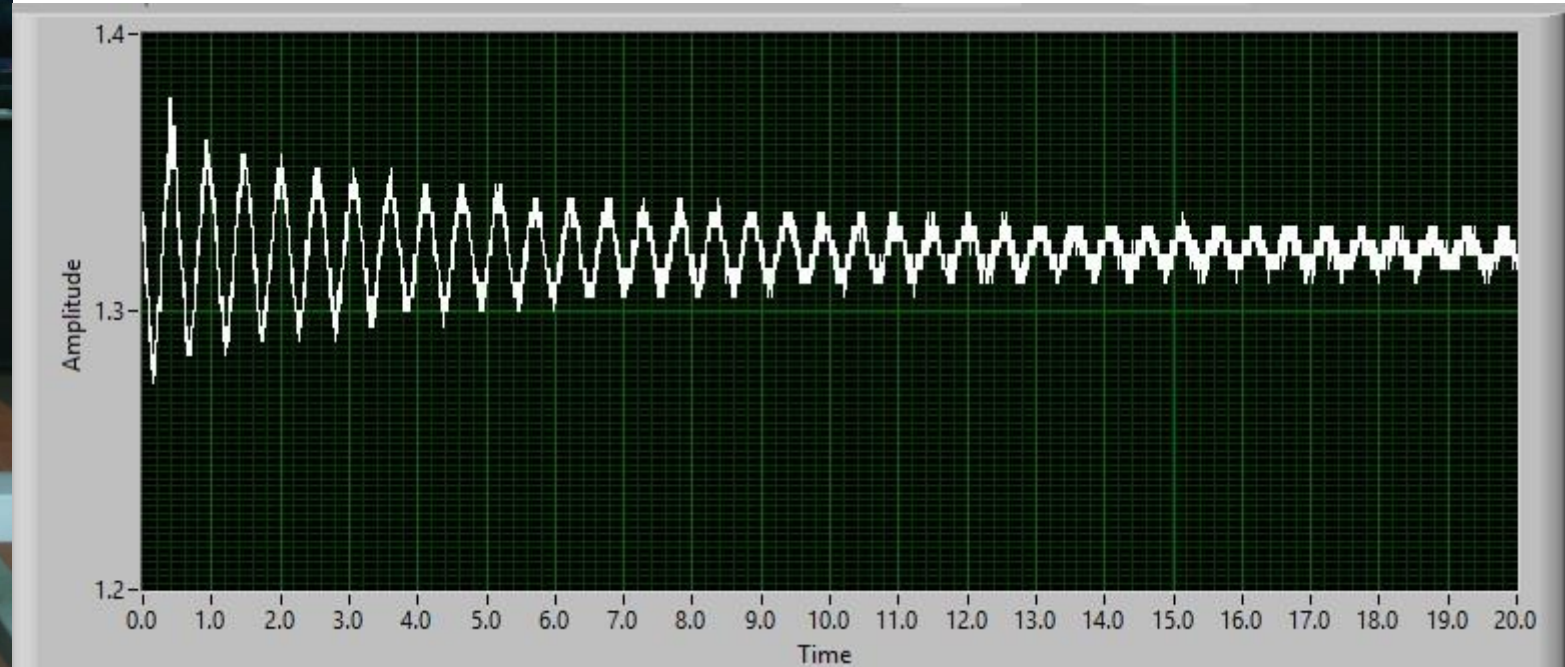


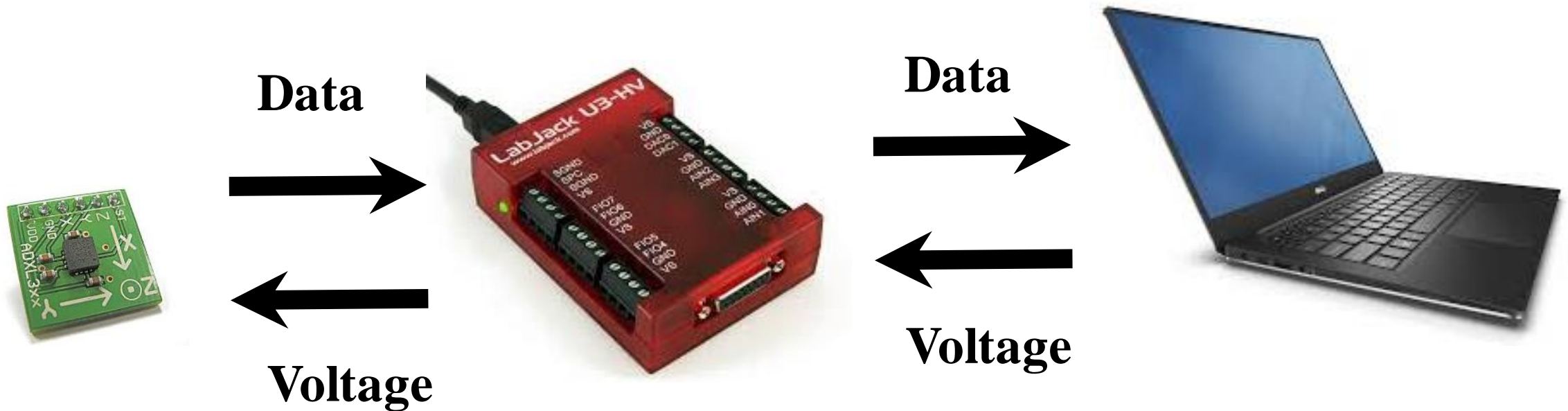
# Data Acquisition and Processing

# Spring-Mass System



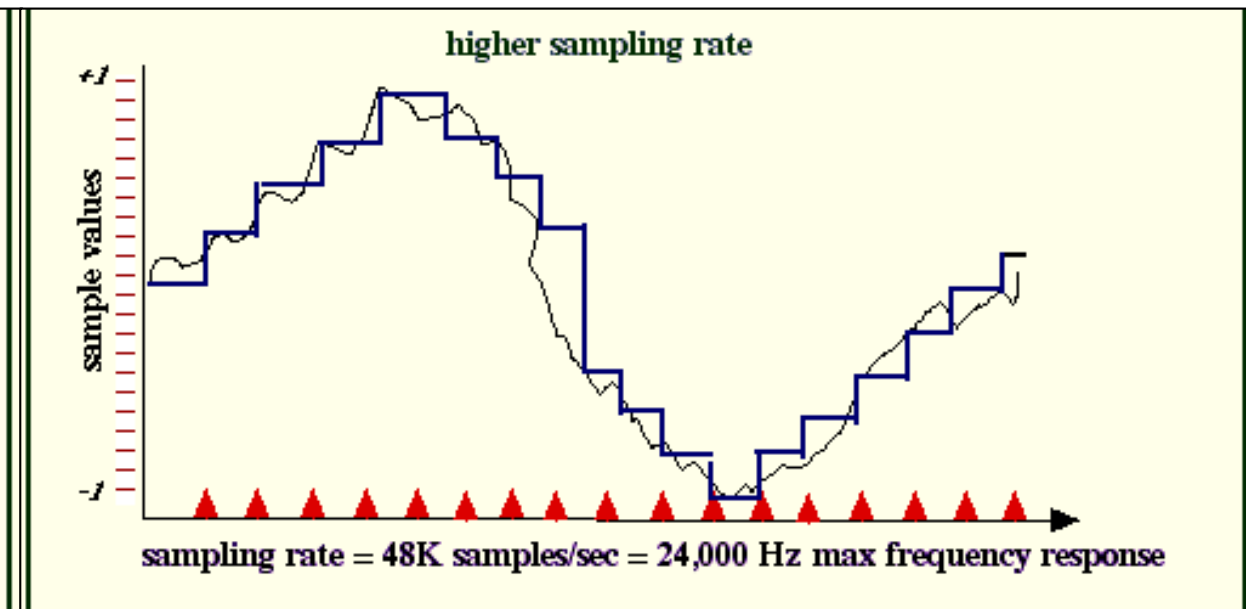
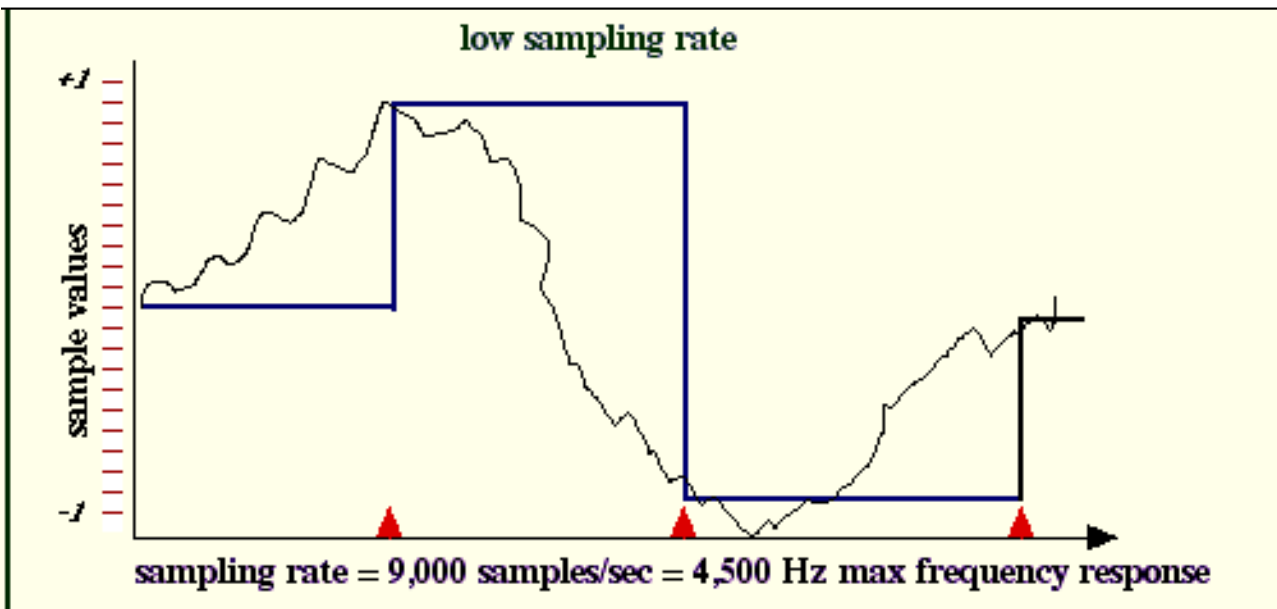
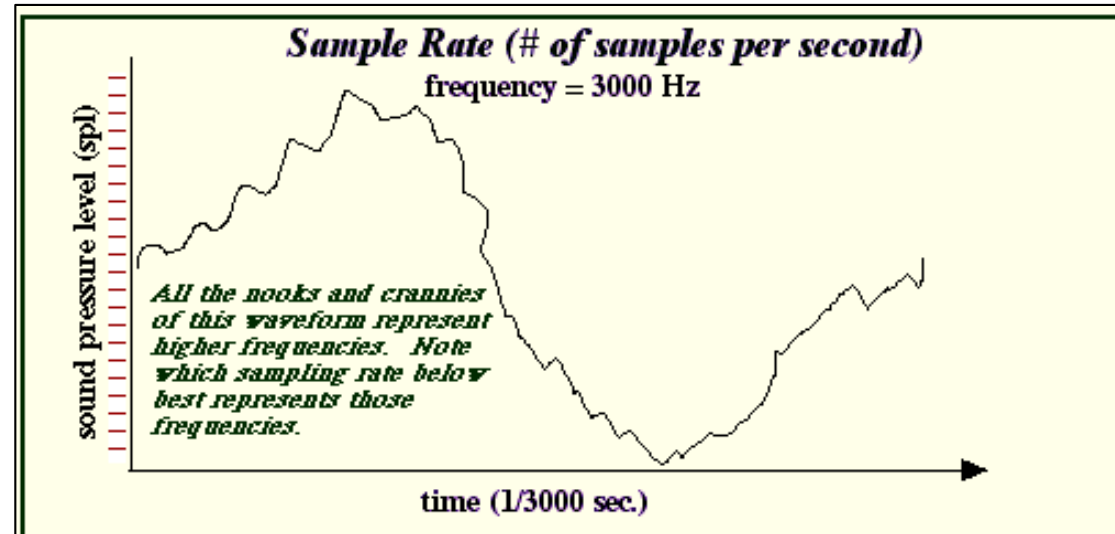
# Data Acquisition

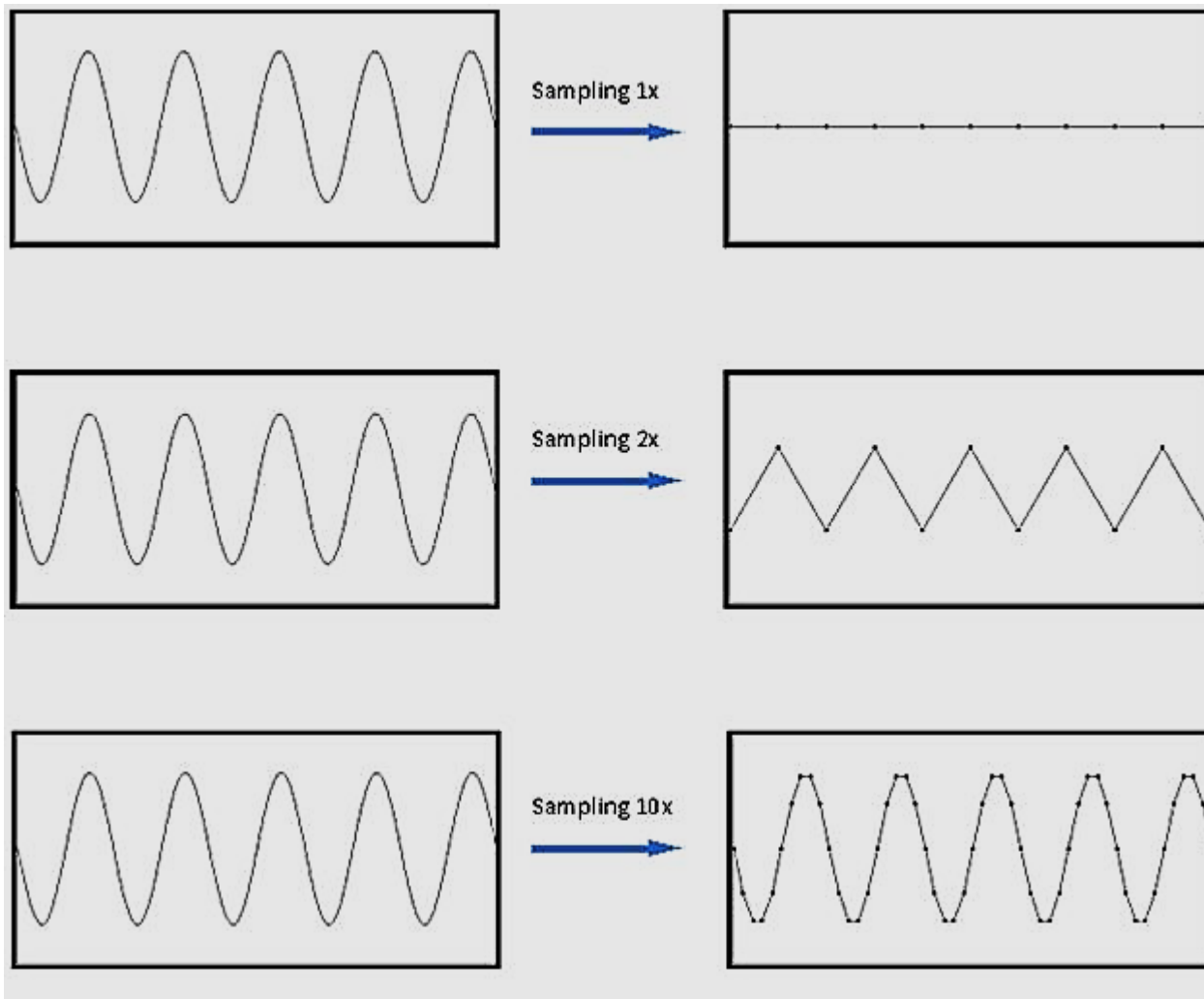
- 3 axis accelerometer
- Data acquisition device (LabJack):



# Signal Processing: Basics

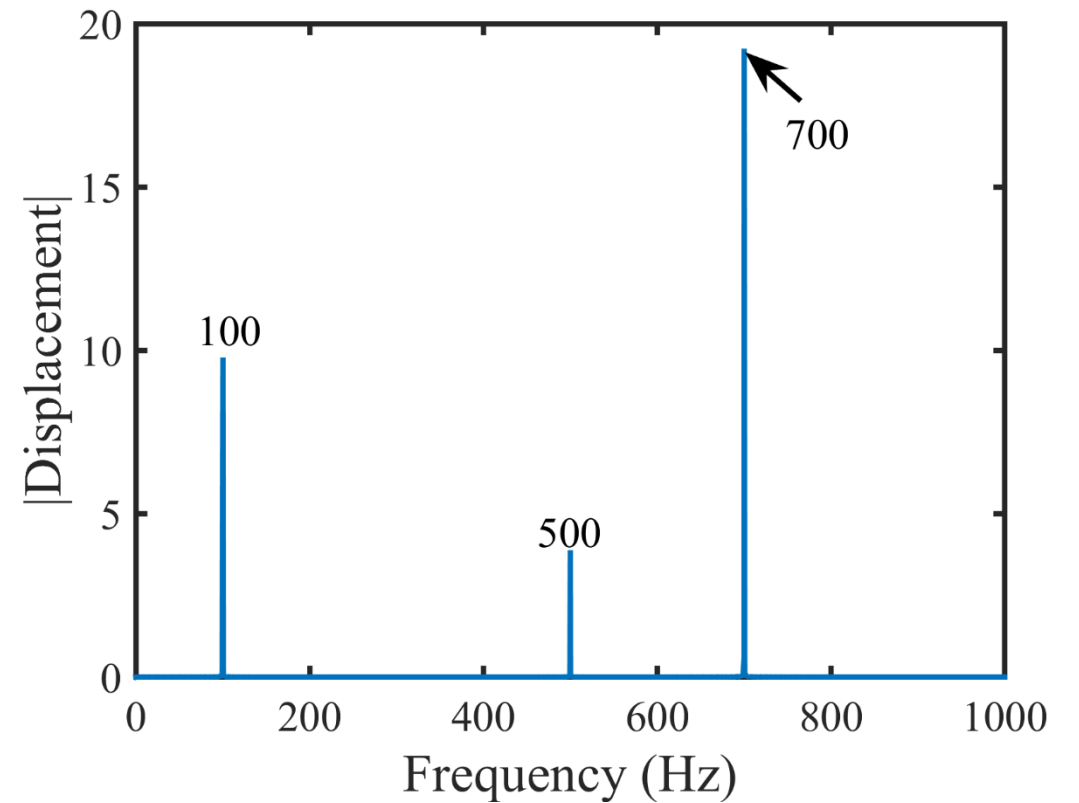
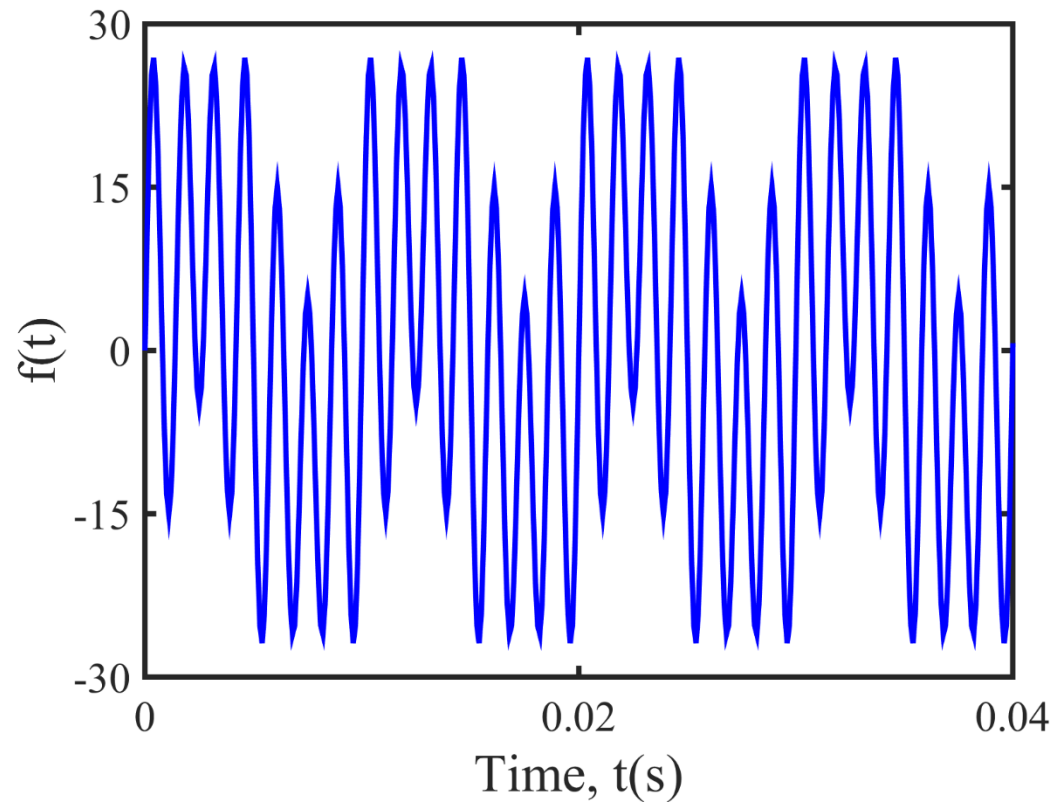
- Sampling frequency



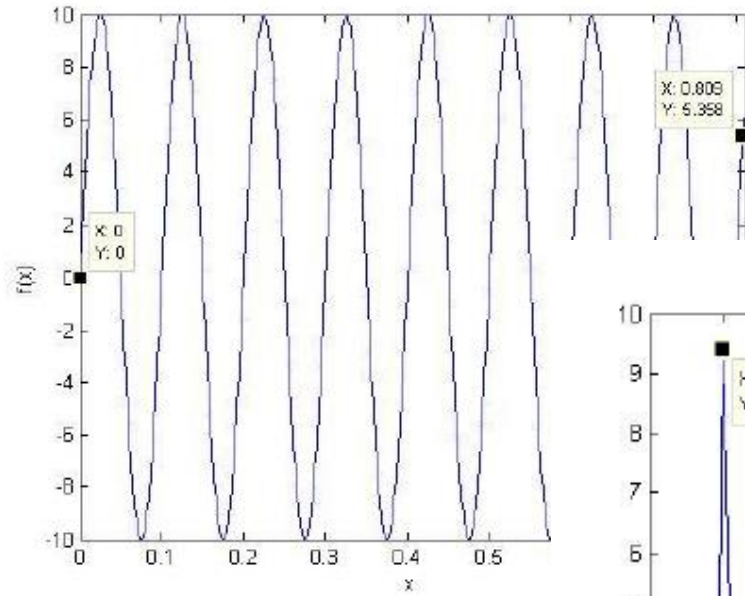


# Fast Fourier Transform (FFT)

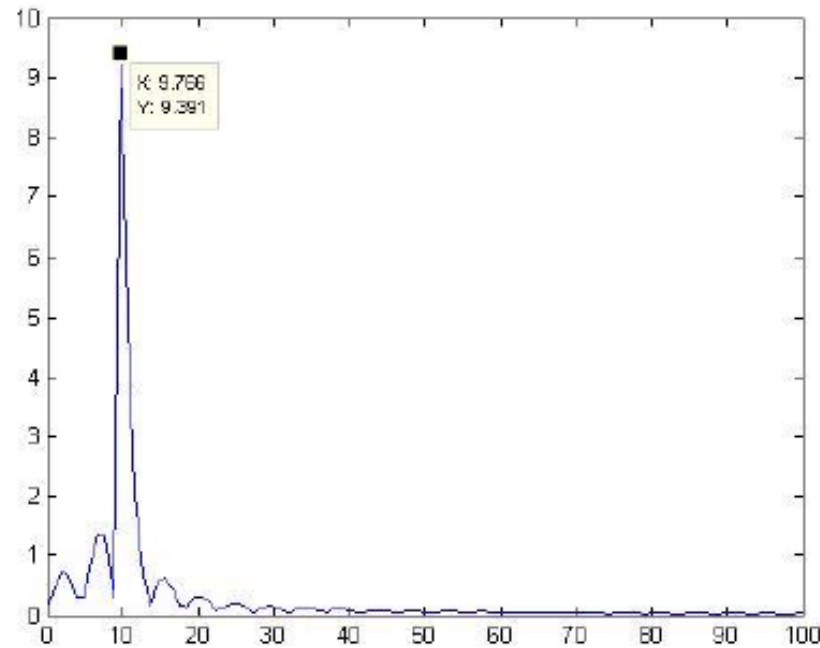
$$f(t) = 10\sin(2\pi 100t) + 5\sin(2\pi 500t) + 20\sin(2\pi 700t)$$



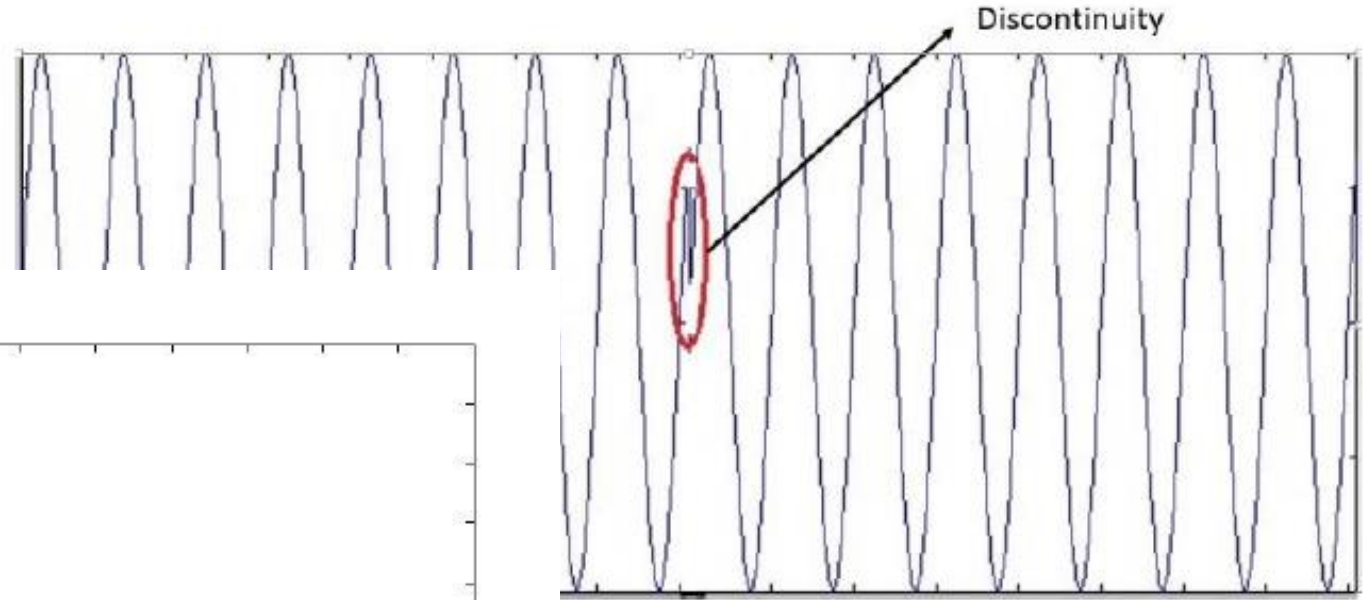
# Windowing



Actual Signal

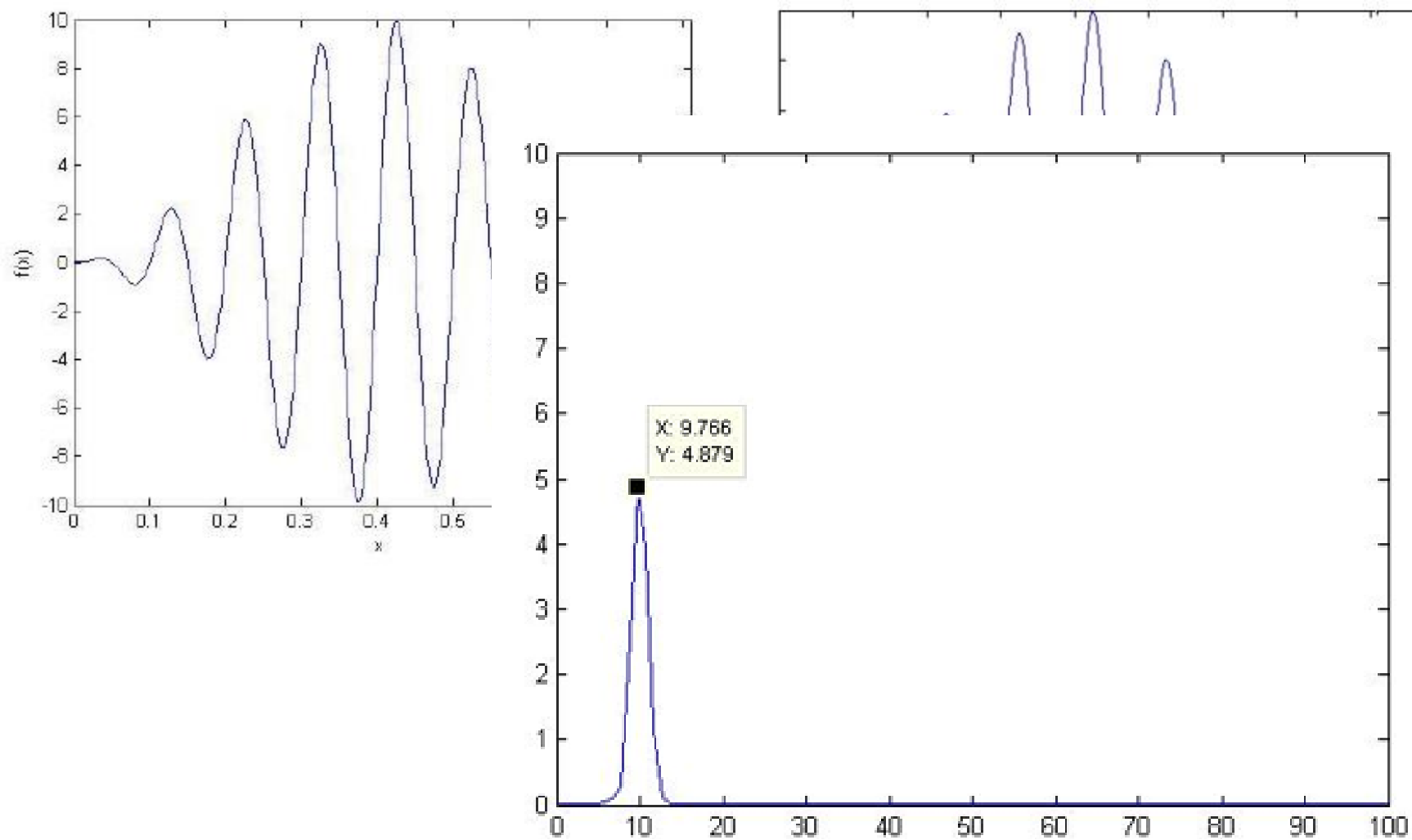


FFT of Recreated Signal



Concatenated Signal





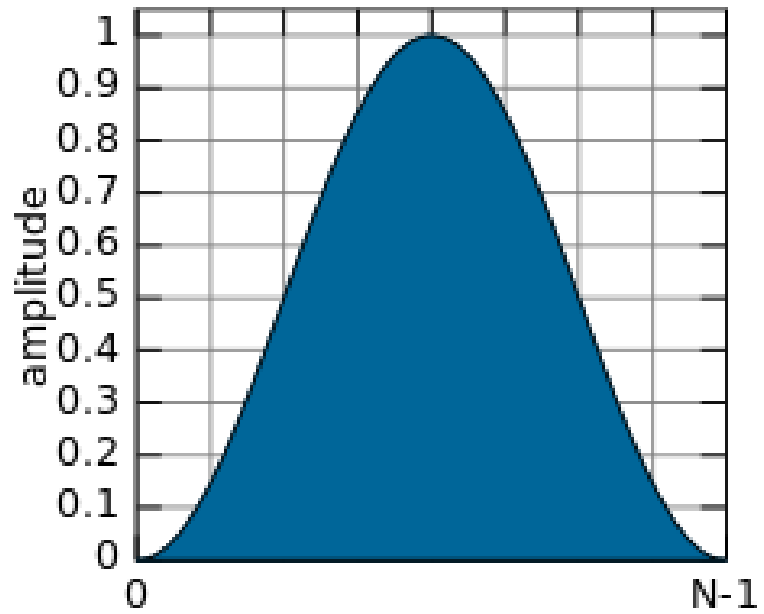
fter Windowing

Modified FFT

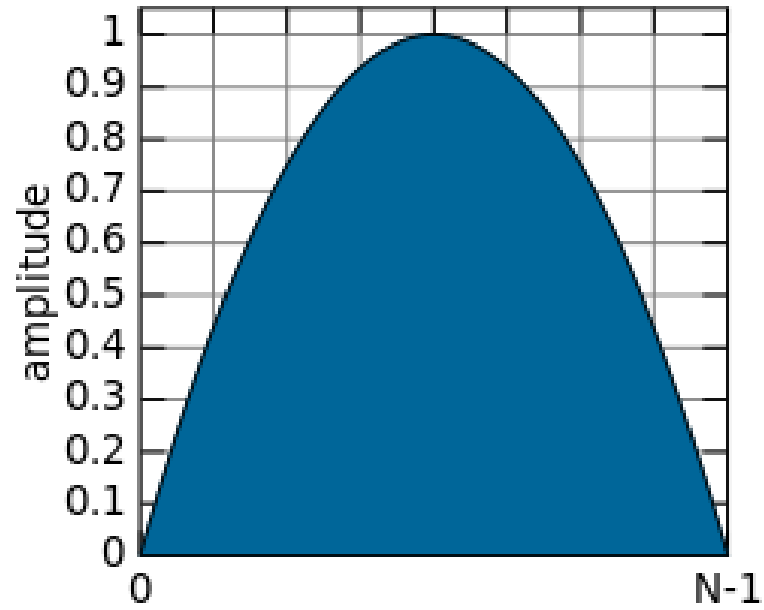


# Types of Windows

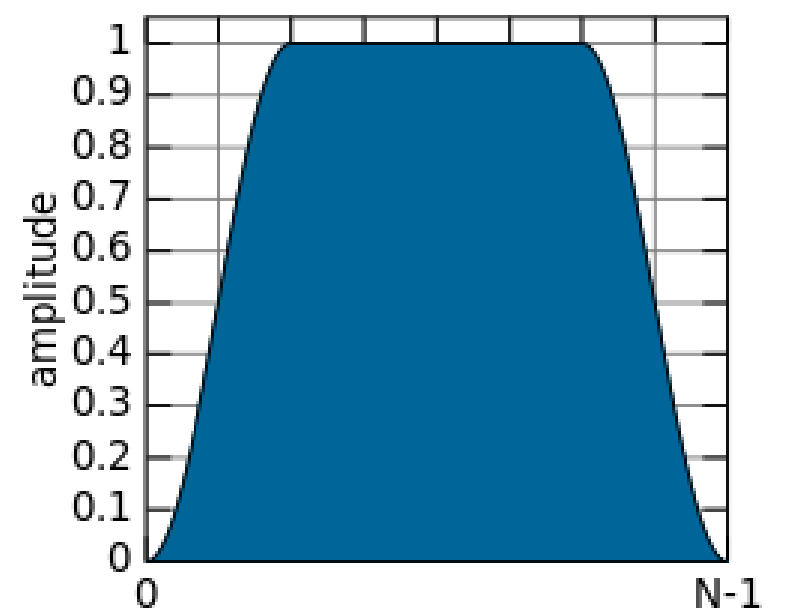
Hann window



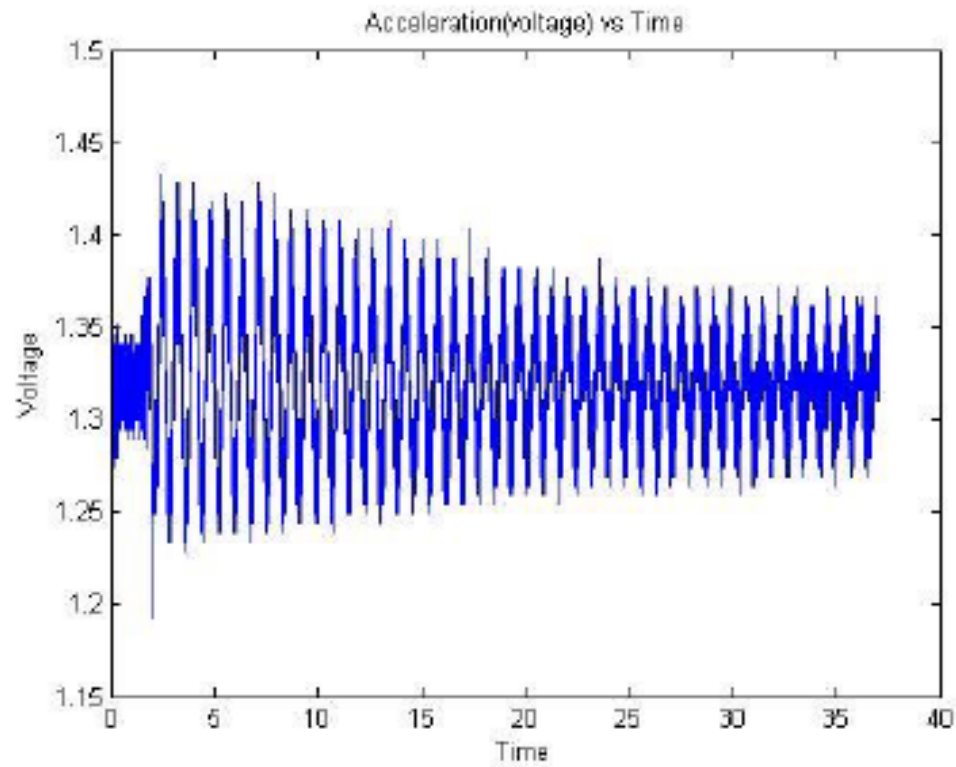
Welch window



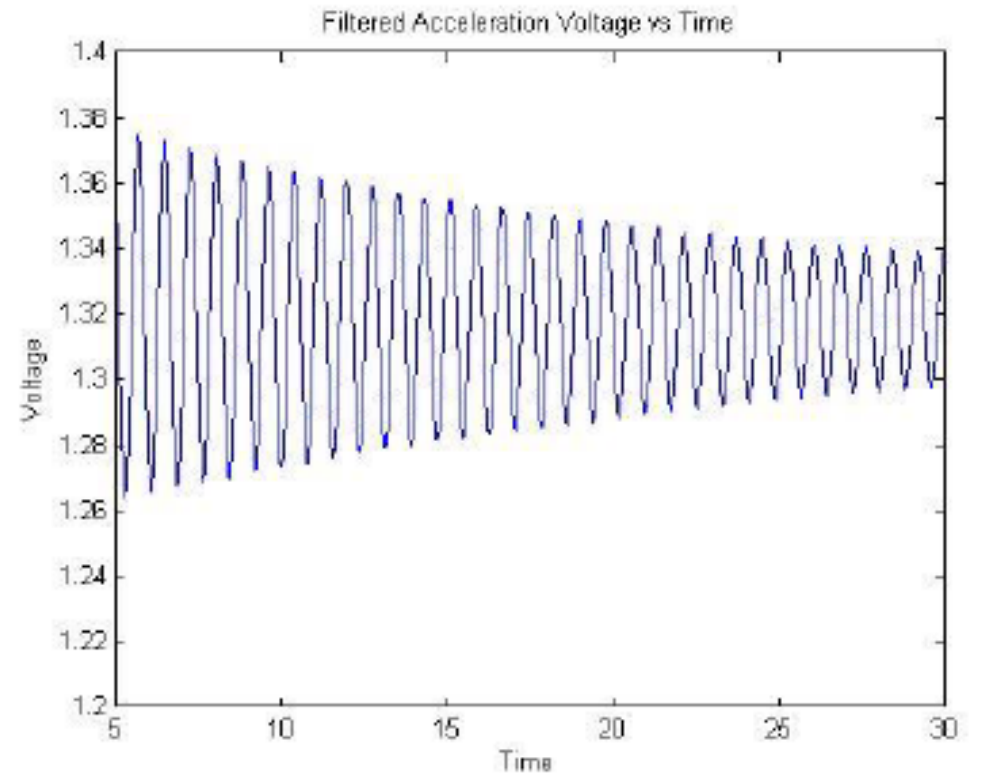
Tukey window ( $\alpha = 0.5$ )



- **Moving average**



Original Signal



Filtered Signal