**Accelerometer Filter Design**

*Overview:*

An Accelerometer detects acceleration through a MEMS device. As an accelerometer works with quickly varying measurements, most of the noise present in an accelerometer is contained in a lower bandwidth.

Using the Matlab Filter Toolbox, a Low pass filter was designed with the following parameters:

Filter Type: Low-Pass, Butterworth, 4th Order.  
Filter Cutoff Frequency: 20 Hz  
Filter Equation:

Accelerometer Output:

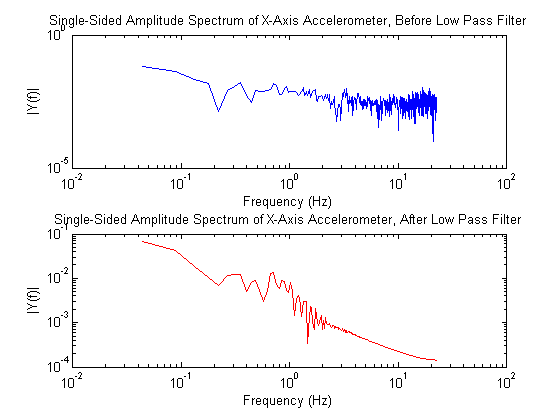
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Figure 1. Accelerometer Filter Results

**Gyroscope Filter Design**

A Gyroscope detects rotational movement through a MEMS device. As a gyroscope works with measurements that are much slower to change, most of the noise present in a gyroscope is present in higher bandwidths.

bandwidth.

Using the Matlab Filter Toolbox, a High pass filter was designed with the following parameters:

Filter Type: High-Pass, Butterworth, 4th Order.  
Filter Cutoff Frequency: 20 Hz  
Filter Equation:

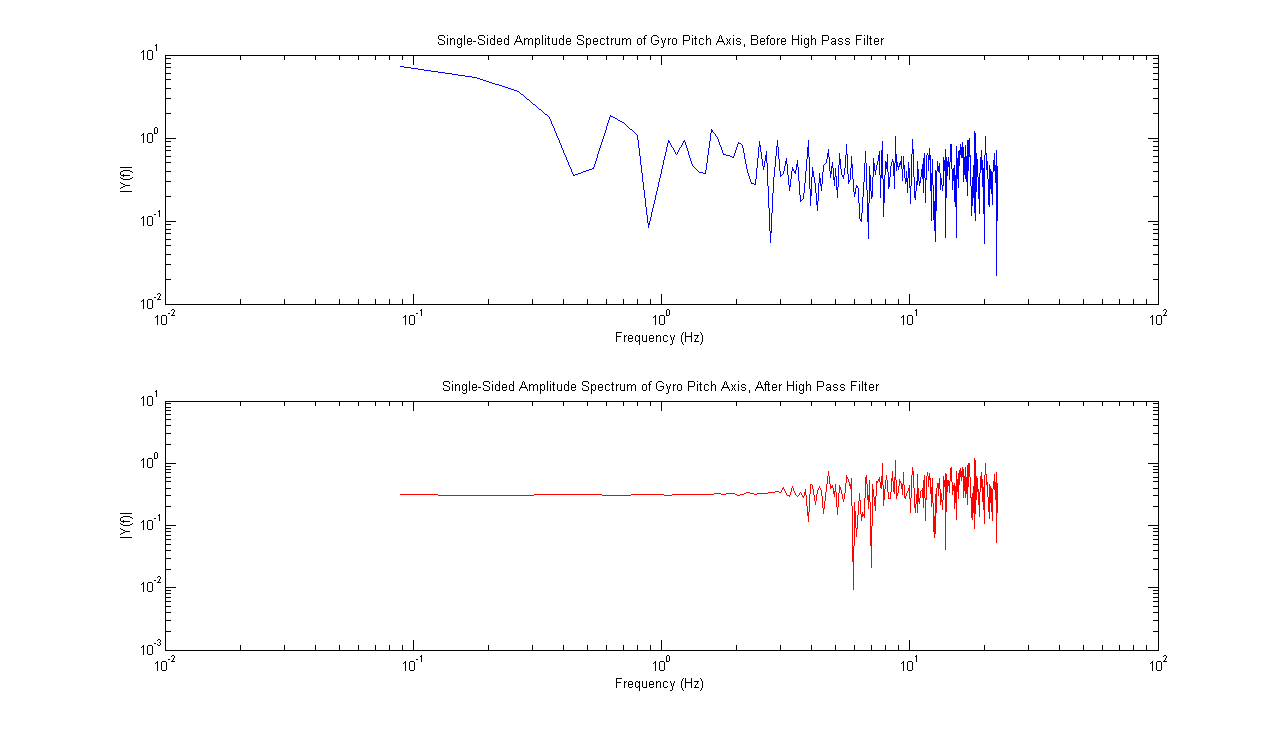


Figure 2. Gyroscope Filter Results

**Kinematic Equations**