The variance filter that was designed last week worked pretty well for the roll, pitch, and yaw data. The following are the graphs for roll, pitch, and yaw when the IMU is stationary.

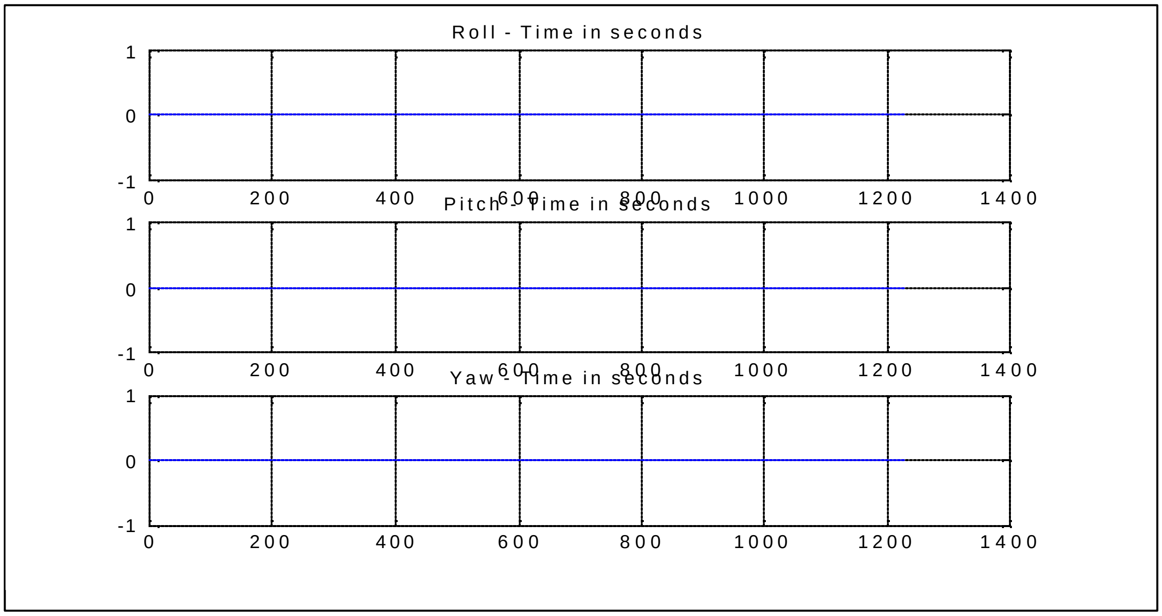


Figure - Stationary Data (Covariance Filtered)

It can also be seen that this filter works well when the IMU is rotating. The following figure shows the IMU rotating 360 degrees on the yaw axis.

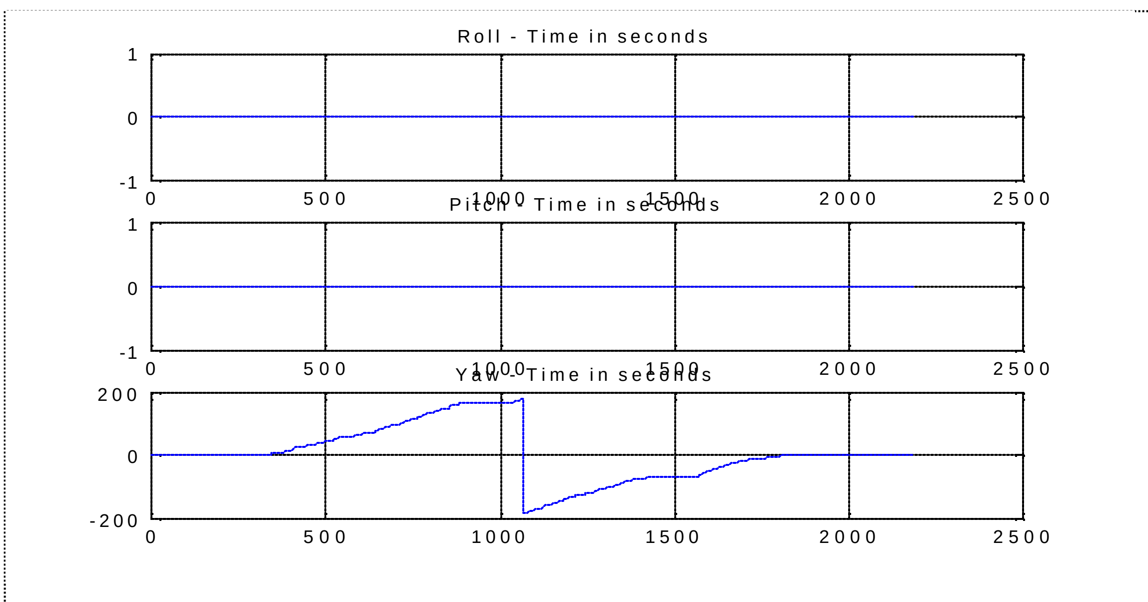


Figure - 360 Degree Yaw Rotation (Covariance Filtered)

The yaw rotates 360 degrees, while the roll and pitch remain at zero the entire time. This is due to the covariance filter. Comparing this to figure 55-1 shows the difference between the filtered and unfiltered data. The following two figures show the covariance filter for a 360 roll rotation and a slight pitch movement one up, then down, then back to zero.

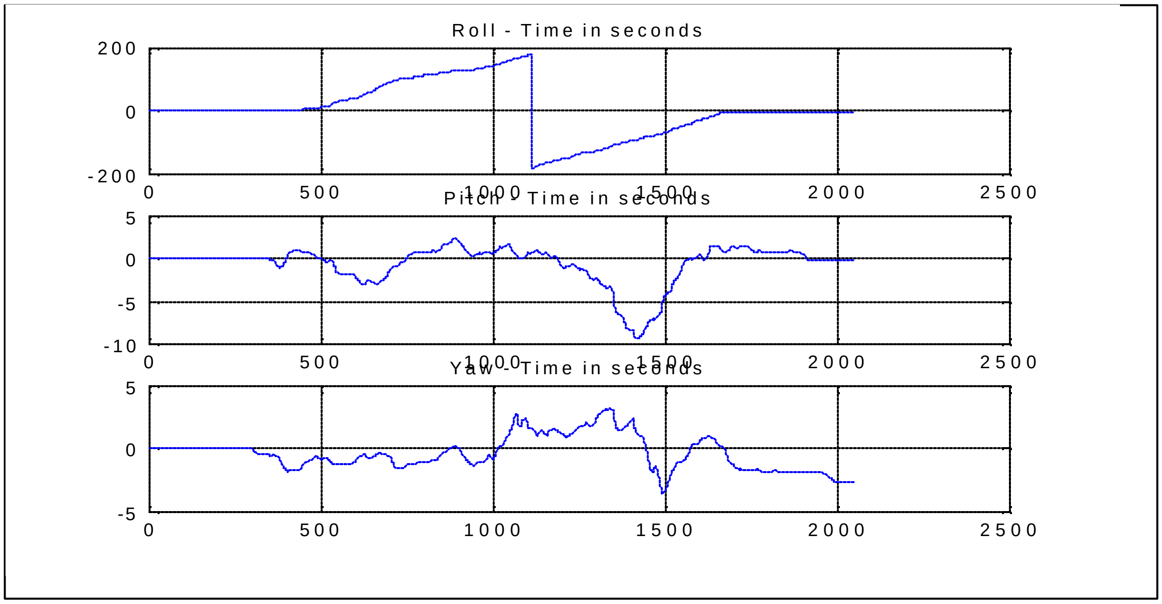
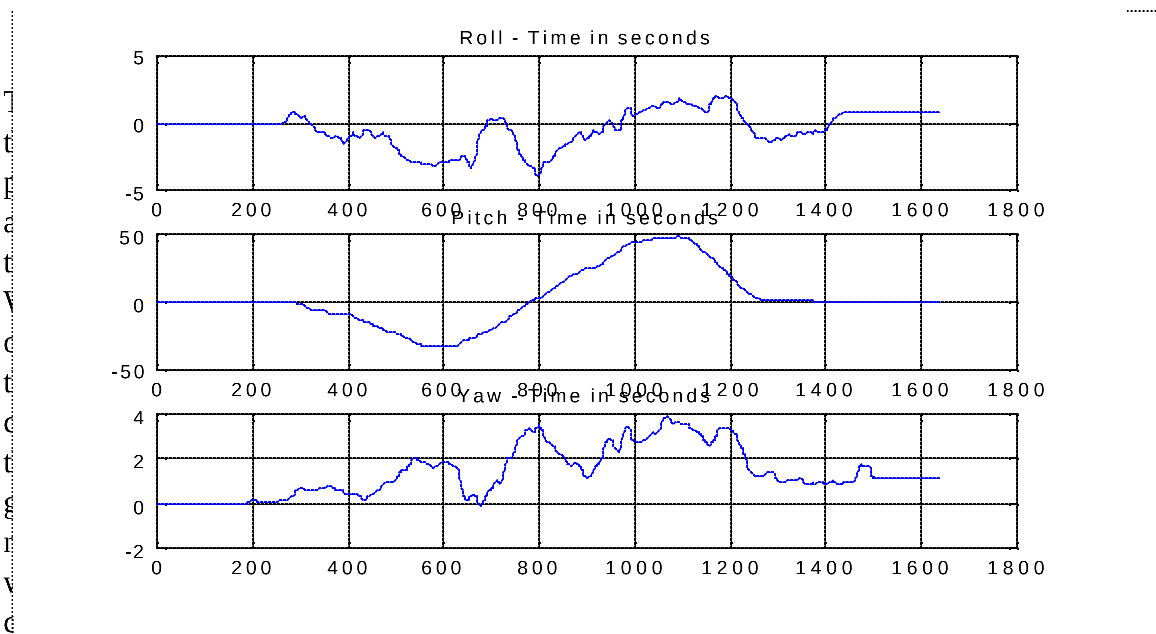


Figure - 360 Degree Roll Rotation (Covariance Filtered)



little time, the error will increase immensely. The following graphs show this dilemma when moving the IMU one meter in the x direction.

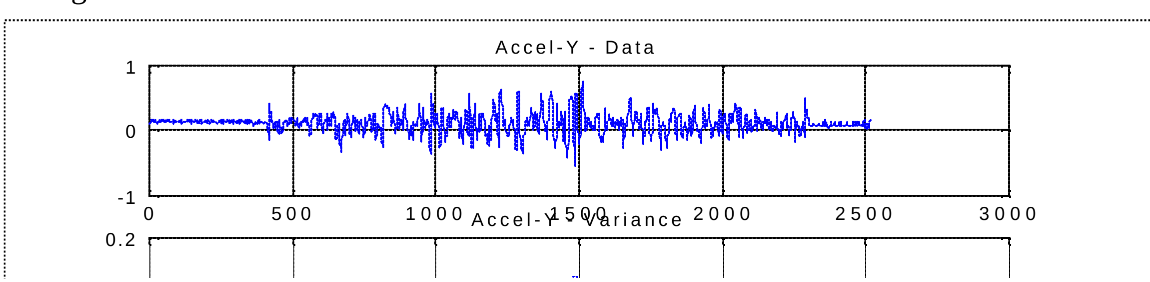


Figure - 1 Meter Movement in X direction (Covariance Filtered)

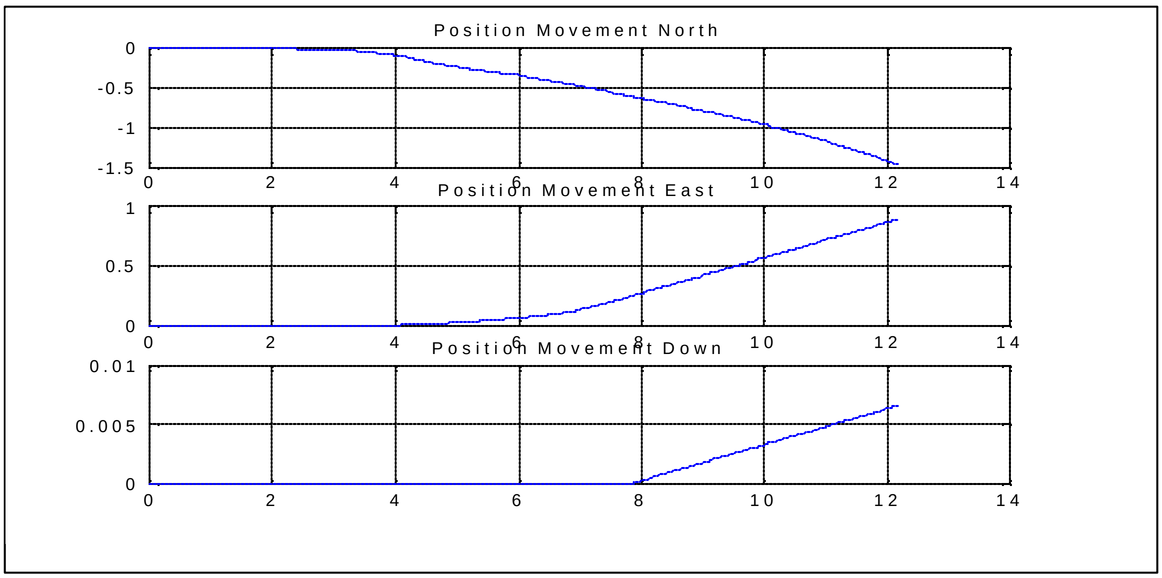


Figure - 1 Meter Movement in X direction (Covariance Filtered)

As seen above, after the first slight movement seen from the y accelerometer, position movement in the east direction starts moving. This increases more and more in a quadratic form. Therefore, even if the IMU rested at the end of this test, after 10 more seconds, the east position would be off by a lot more.