

## Calibration results

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### Normalized Residuals

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Reprojection error (cam0): mean 0.279165781384, median 0.212257456285, std: 0.258279135014

Gyroscope error (imu0): mean 1.49957997732, median 1.23858269416, std: 1.7339556053

Accelerometer error (imu0): mean 0.486836986629, median 0.35659208034, std: 0.45745123439

### Residuals

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Reprojection error (cam0) [px]: mean 0.279165781384, median 0.212257456285, std: 0.258279135014

Gyroscope error (imu0) [rad/s]: mean 0.00424145268358, median 0.00350324088842, std: 0.00490436706713

Accelerometer error (imu0) [m/s<sup>2</sup>]: mean 0.0550793175325, median 0.0403437885001, std: 0.0517546991839

### Transformation (cam0):

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T\_ci: (imu0 to cam0):

[[ -0.00384277 -0.00588274 0.99997531 0.01880944]

[ -0.0036445 -0.99997597 -0.00589675 -0.00655138]

[ 0.99998598 -0.00366707 0.00382124 -0.03096996]

[ 0. 0. 0. 1. ]]

T\_ic: (cam0 to imu0):

[[ -0.00384277 -0.0036445 0.99998598 0.03101793]

[ -0.00588274 -0.99997597 -0.00366707 -0.00655414]

[ 0.99997531 -0.00589675 0.00382124 -0.01872927]

[ 0. 0. 0. 1. ]]

timeshift cam0 to imu0: [s] (t\_imu = t\_cam + shift)

-0.0002461323706023885

Gravity vector in target coords: [m/s<sup>2</sup>]

[ 0.04061474 -9.77218151 -0.81929355]

### Calibration configuration

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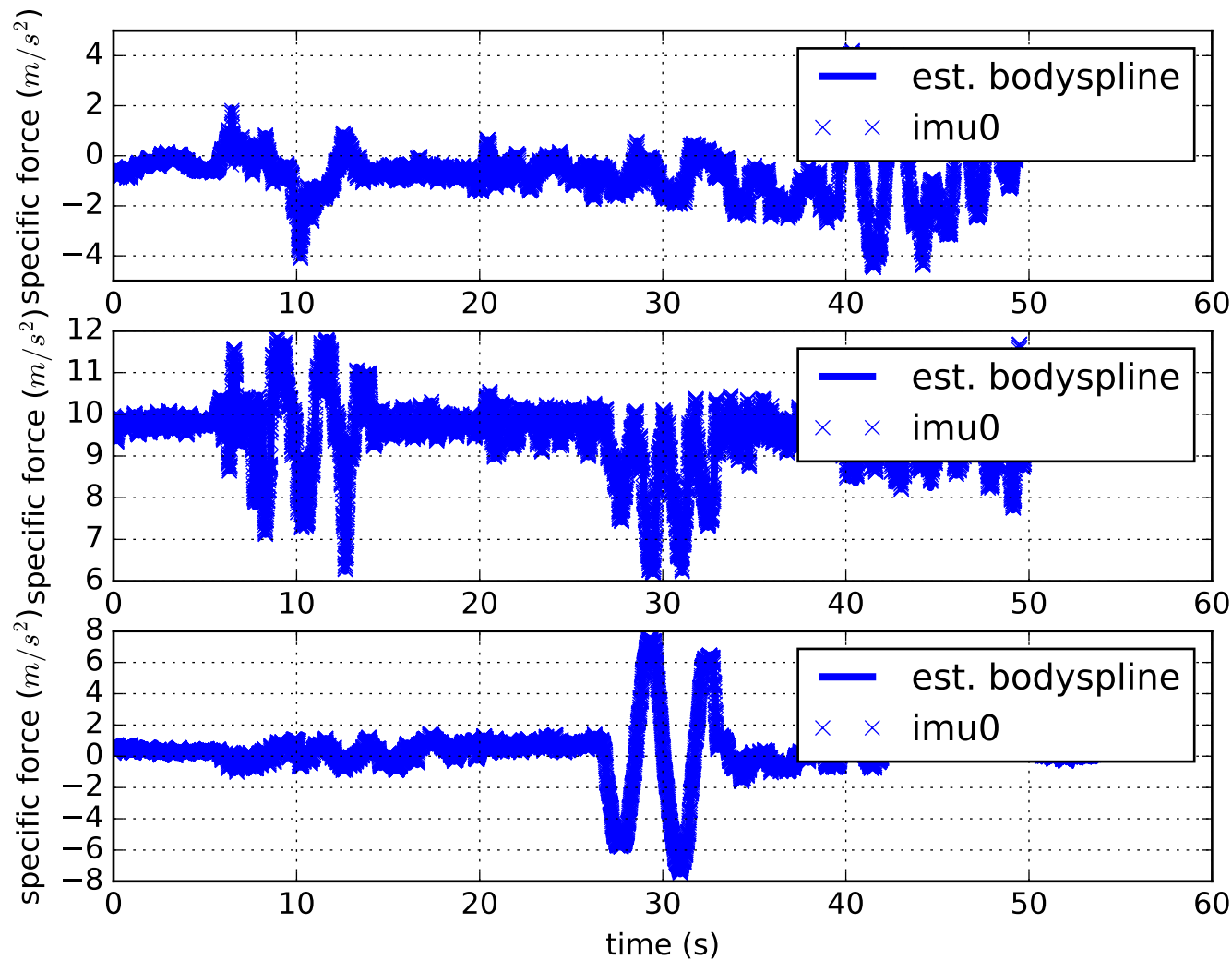
cam0

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Camera model: pinhole  
Focal length: [305.0071852594656, 304.9990337382335]  
Principal point: [358.6141807078531, 279.8744845100453]  
Distortion model: equidistant  
Distortion coefficients: [0.022686521839611323, 0.0035957892235648835, 0.004473372648469369, -0.00011915689410269171]  
Type: aprilgrid  
Tags:  
  Rows: 6  
  Cols: 6  
  Size: 0.083 [m]  
  Spacing 0.0249 [m]

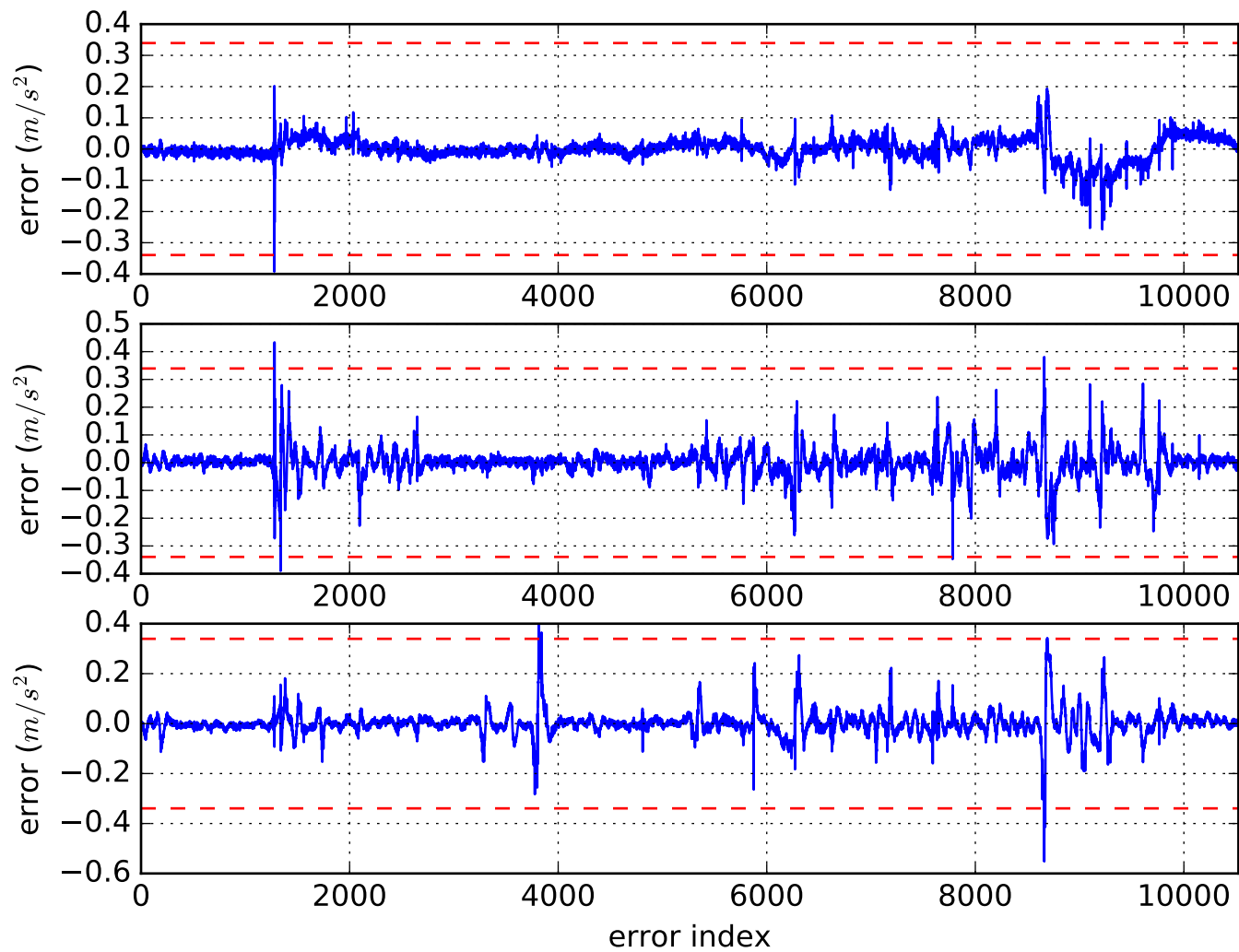
IMU configuration  
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IMU0:  
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Model: calibrated  
Update rate: 200.0  
Accelerometer:  
  Noise density: 0.008  
  Noise density (discrete): 0.11313708499  
  Random walk: 0.0002  
Gyroscope:  
  Noise density: 0.0002  
  Noise density (discrete): 0.00282842712475  
  Random walk: 4e-06  
T\_i\_b  
  [[1. 0. 0. 0.]  
  [0. 1. 0. 0.]  
  [0. 0. 1. 0.]  
  [0. 0. 0. 1.]]  
time offset with respect to IMU0: 0.0 [s]

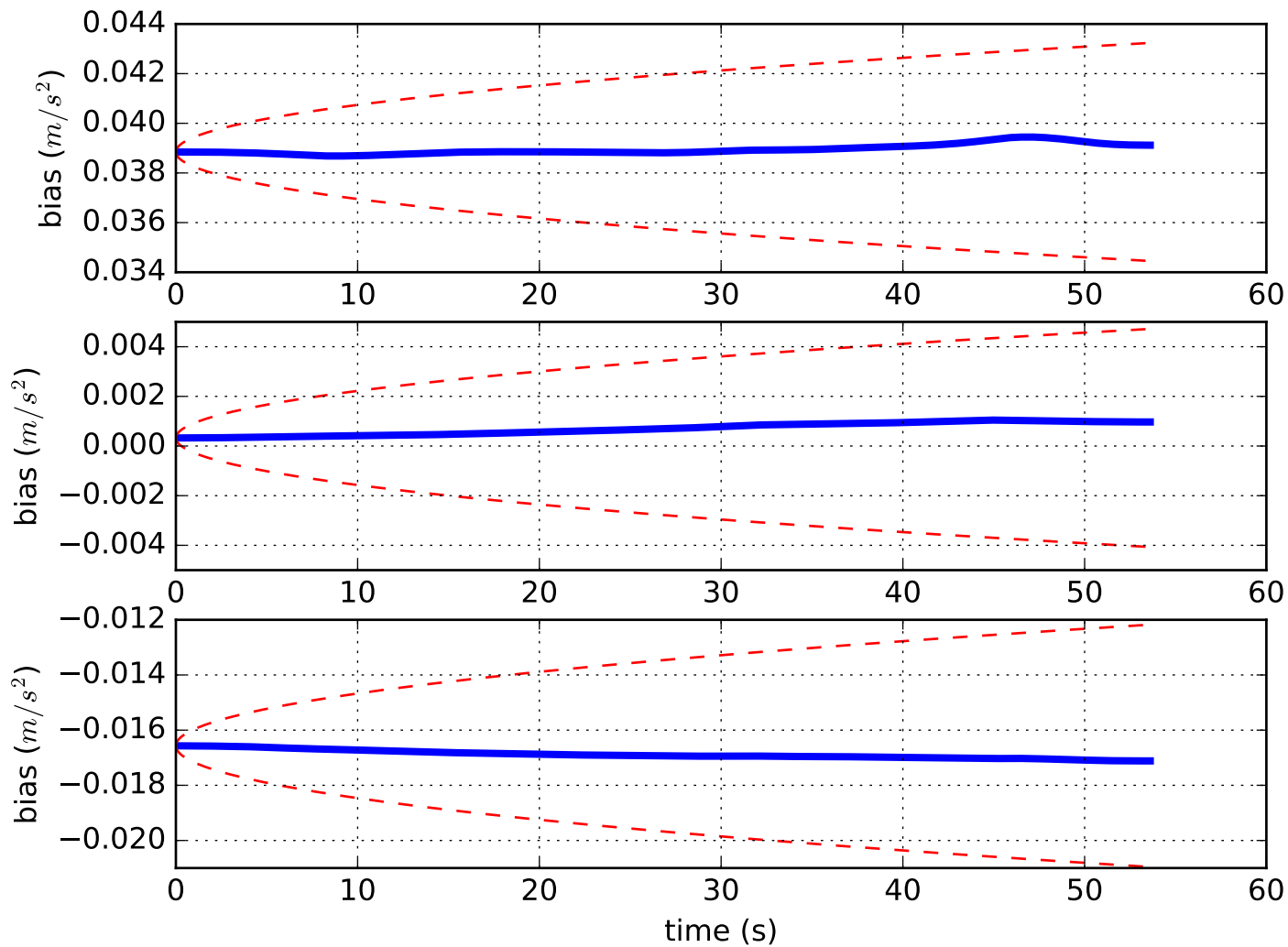
Comparison of predicted and measured specific force (imu0 frame)



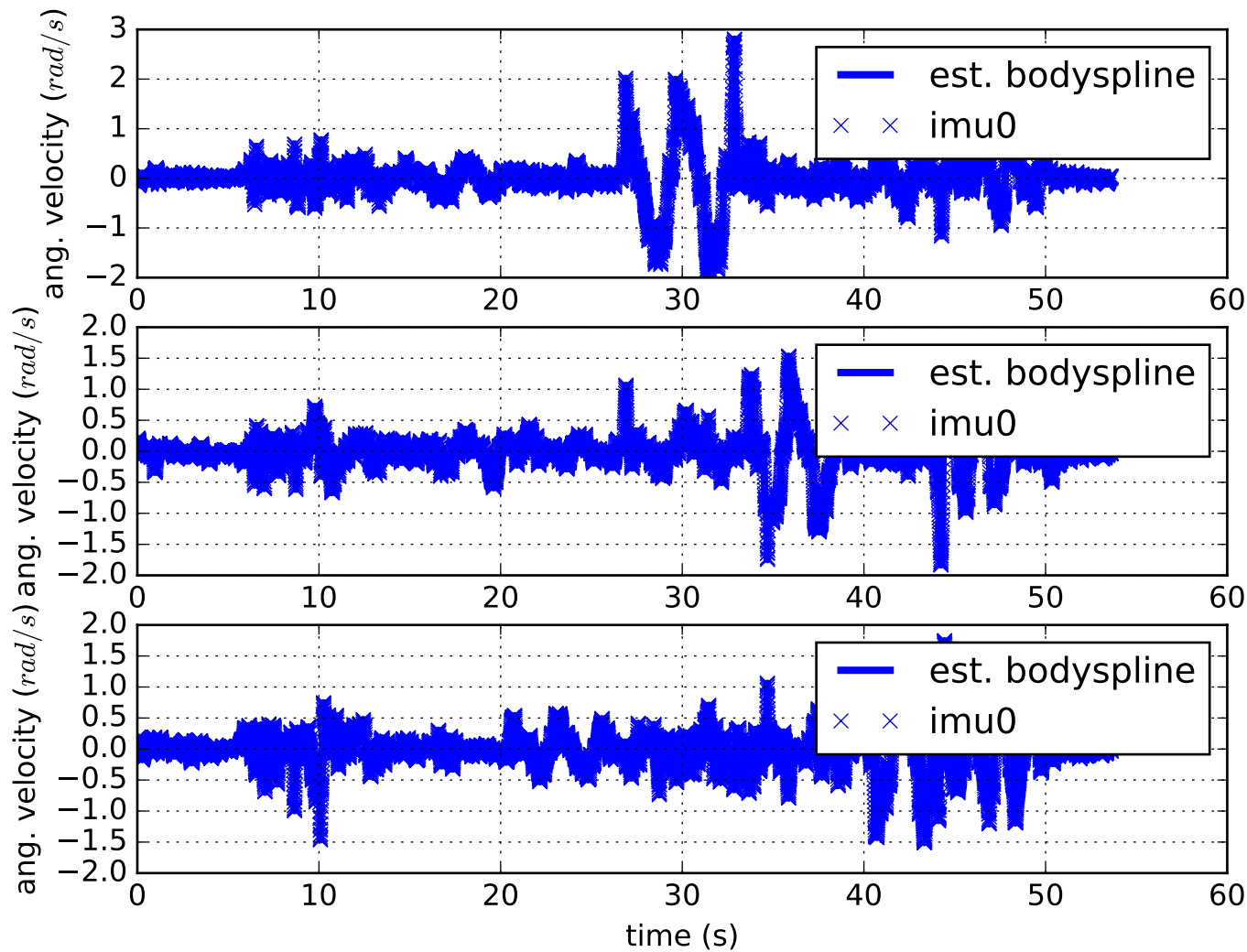
imu0: acceleration error



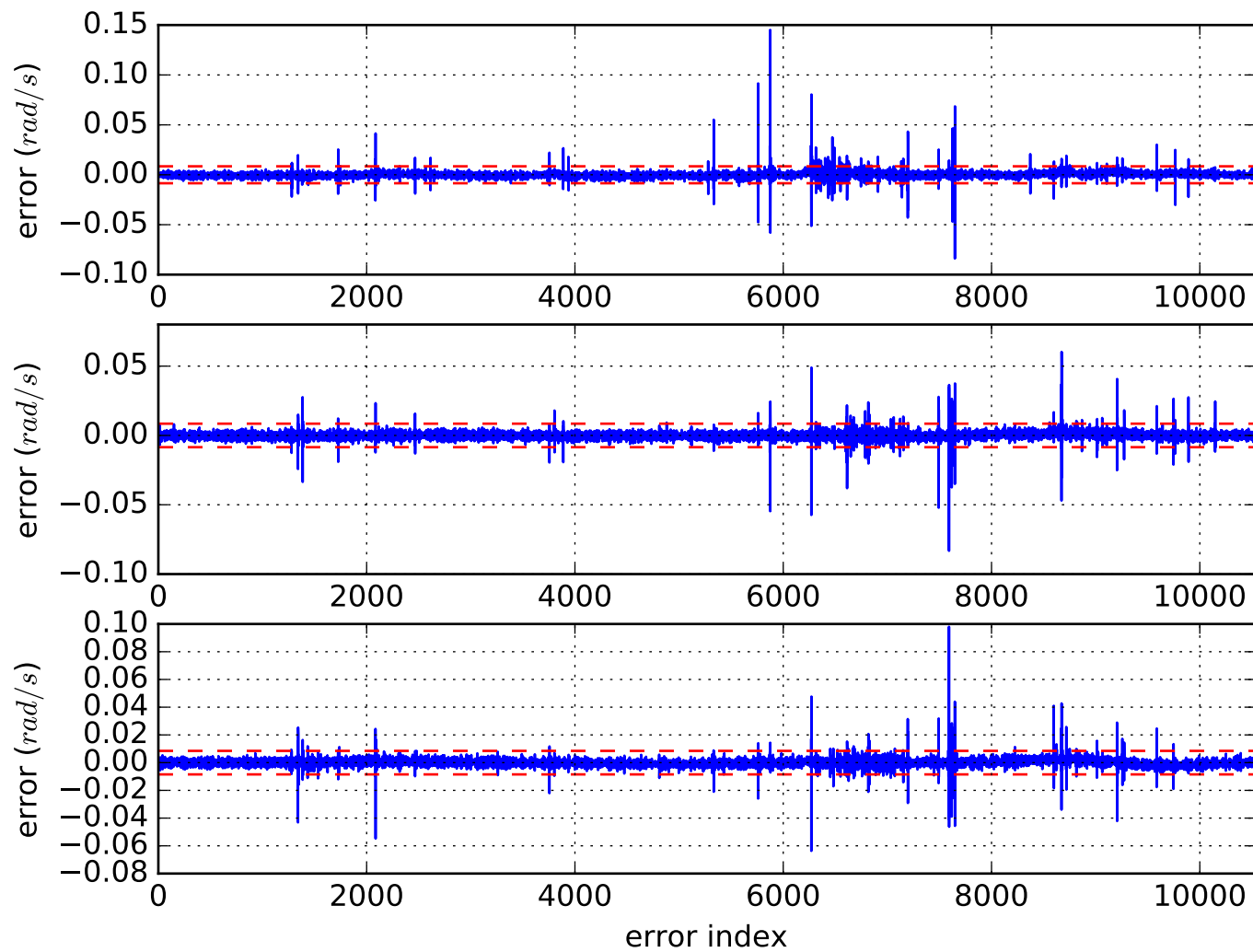
imu0: estimated accelerometer bias (imu frame)



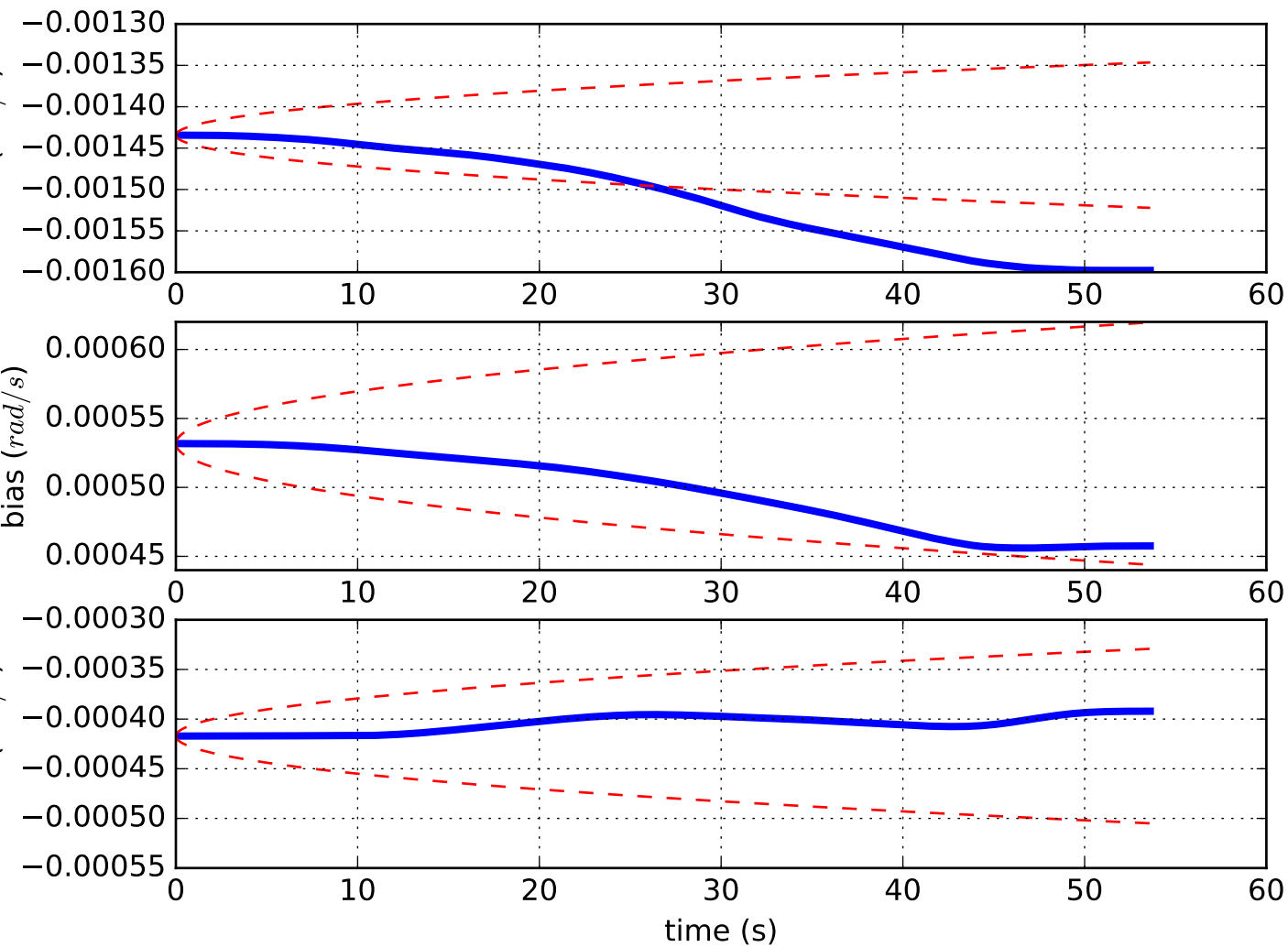
Comparison of predicted and measured angular velocities (body frame)



imu0: angular velocities error



imu0: estimated gyro bias (imu frame)





cam0: reprojection errors

