

Calibration results

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Normalized Residuals

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Reprojection error (cam0): mean 4.78446727883, median 4.85103792729, std: 1.16711076389

Gyroscope error (imu0): mean 0.908336191638, median 0.727070503464, std: 0.766025785502

Accelerometer error (imu0): mean 0.866307001444, median 0.667372901178, std: 0.735763568653

Residuals

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Reprojection error (cam0) [px]: mean 4.78446727883, median 4.85103792729, std: 1.16711076389

Gyroscope error (imu0) [rad/s]: mean 0.0289129296417, median 0.023143125315, std: 0.0243830971878

Accelerometer error (imu0) [m/s^2]: mean 0.216239980374, median 0.166583789364, std: 0.183654869902

Transformation (cam0):

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T\_ci: (imu0 to cam0):

```
[ [ 0.02549251  0.99817384 -0.05476421 -0.02494801]
[ -0.23050242  0.05917503  0.97127079  0.08447917]
[  0.97273777 -0.01213685  0.23159001 -0.12258183]
[  0.          0.          0.          1.        ]]
```

T\_ic: (cam0 to imu0):

```
[ [ 0.02549251 -0.23050242  0.97273777  0.13934862]
[  0.99817384  0.05917503 -0.01213685  0.01841564]
[ -0.05476421  0.97127079  0.23159001 -0.05502968]
[  0.          0.          0.          1.        ]]
```

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

-0.121369894167

Gravity vector in target coords: [m/s^2]

```
[ 0.00647781  9.80648191 -0.03596532]
```

Calibration configuration

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cam0

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Camera model: pinhole  
Focal length: [539.403503, 529.838562]  
Principal point: [429.275072, 238.941372]  
Distortion model: radtan  
Distortion coefficients: [0.004974, -0.00013, -0.001212, 0.002192]  
Type: aprilgrid  
Tags:  
  Rows: 6  
  Cols: 6  
  Size: 0.034 [m]  
  Spacing 0.00102 [m]

## IMU configuration

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### IMU0:

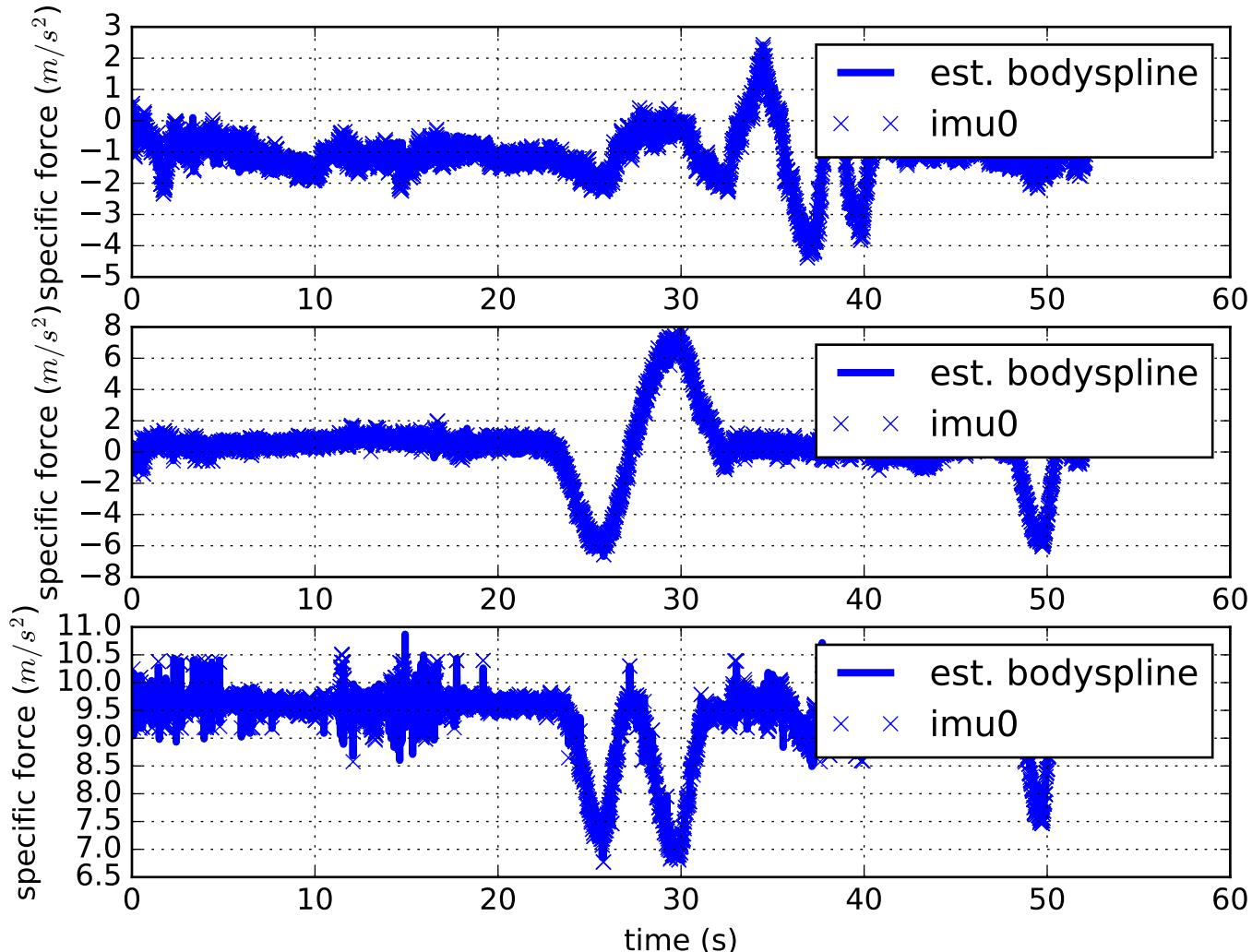
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  Model: calibrated  
  Update rate: 160.0  
  Accelerometer:  
    Noise density: 0.0197335026161  
    Noise density (discrete): 0.249611257919  
    Random walk: 0.00130379197326  
  Gyroscope:  
    Noise density: 0.0025164336822  
    Noise density (discrete): 0.031830648066  
    Random walk: 8.83855712176e-05

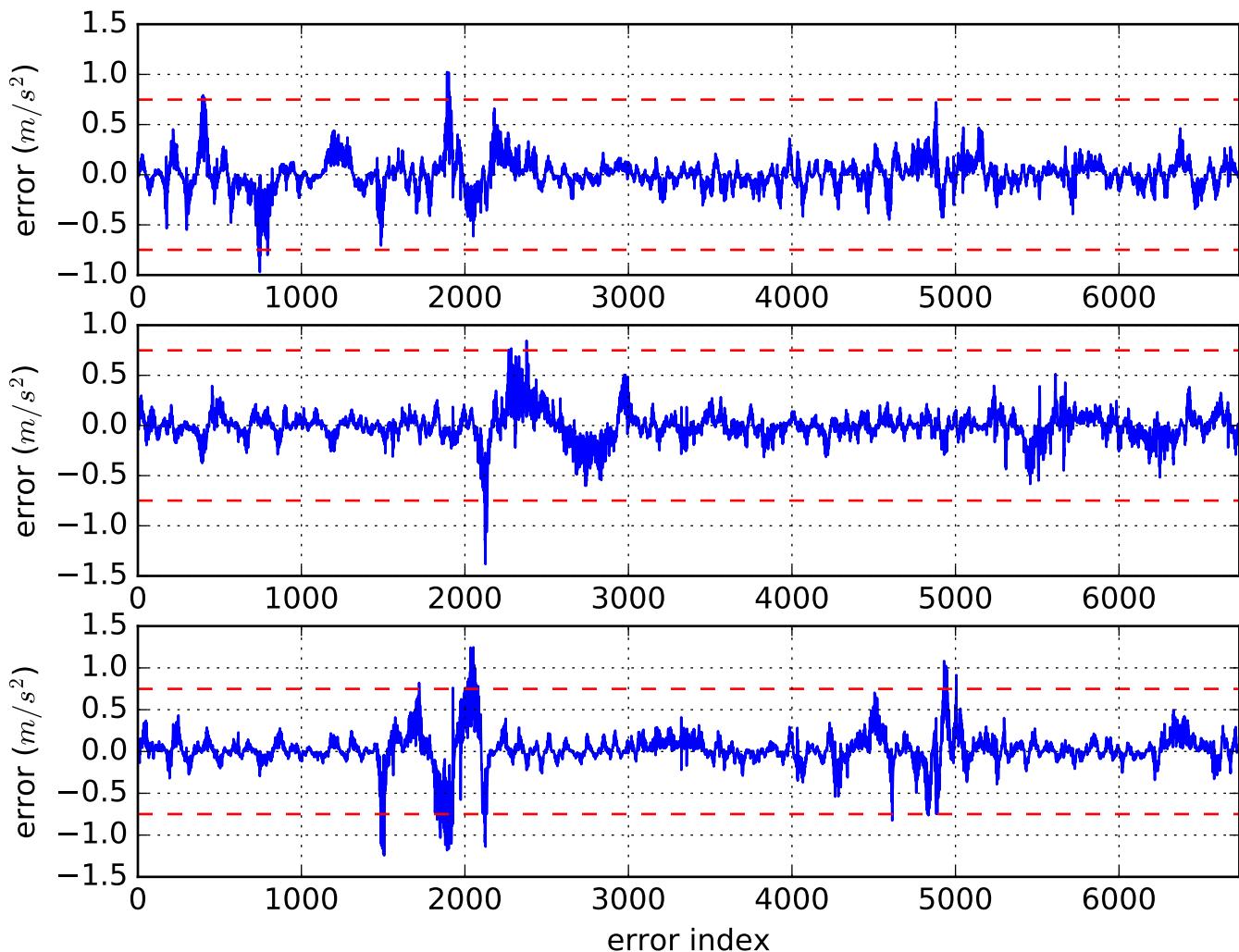
  T\_i\_b  
  [[ 1. 0. 0. 0.]  
   [ 0. 1. 0. 0.]  
   [ 0. 0. 1. 0.]  
   [ 0. 0. 0. 1.]]

time offset with respect to IMU0: 0.0 [s]

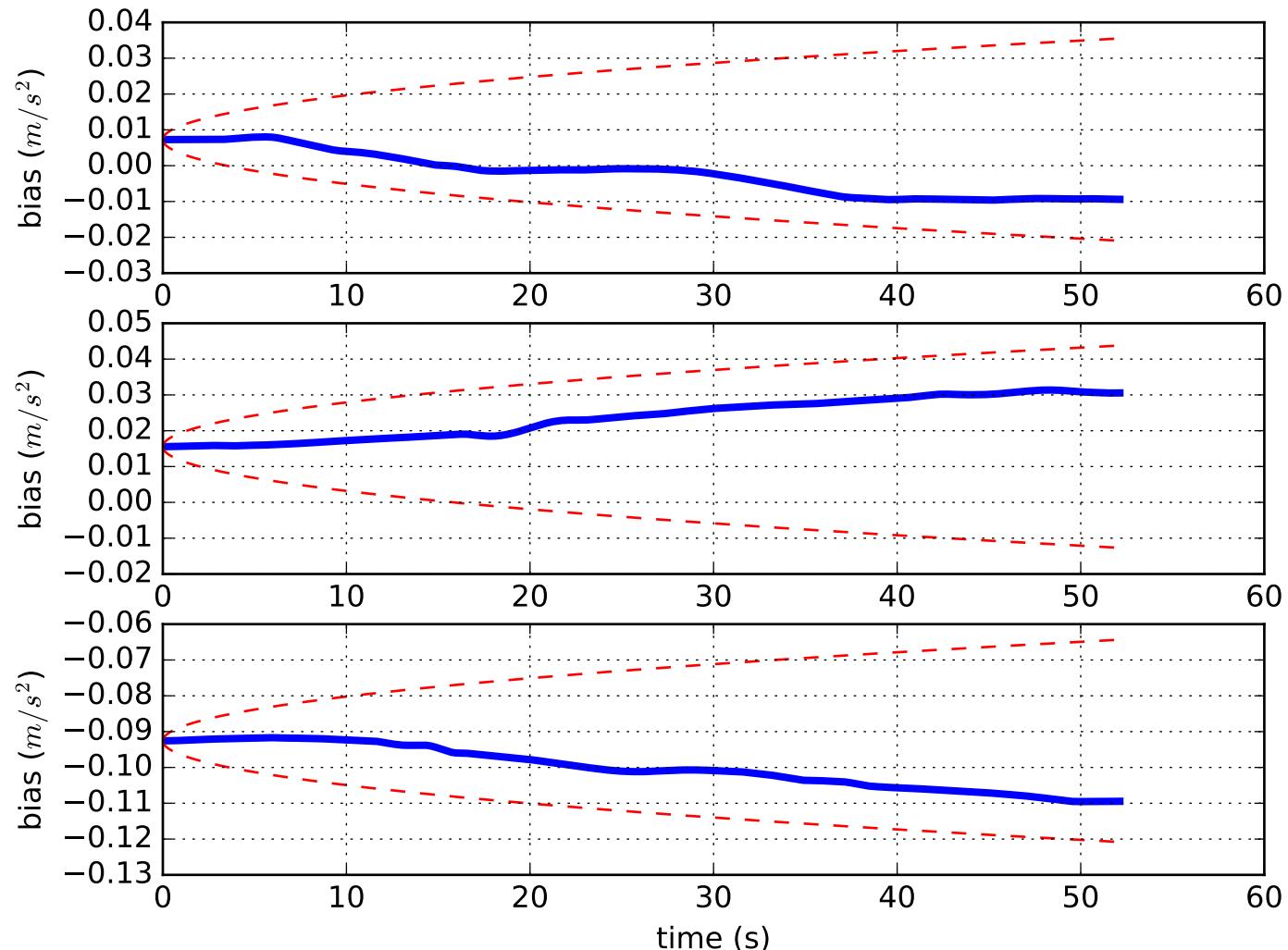
Comparison of predicted and measured specific force (imu0 frame)



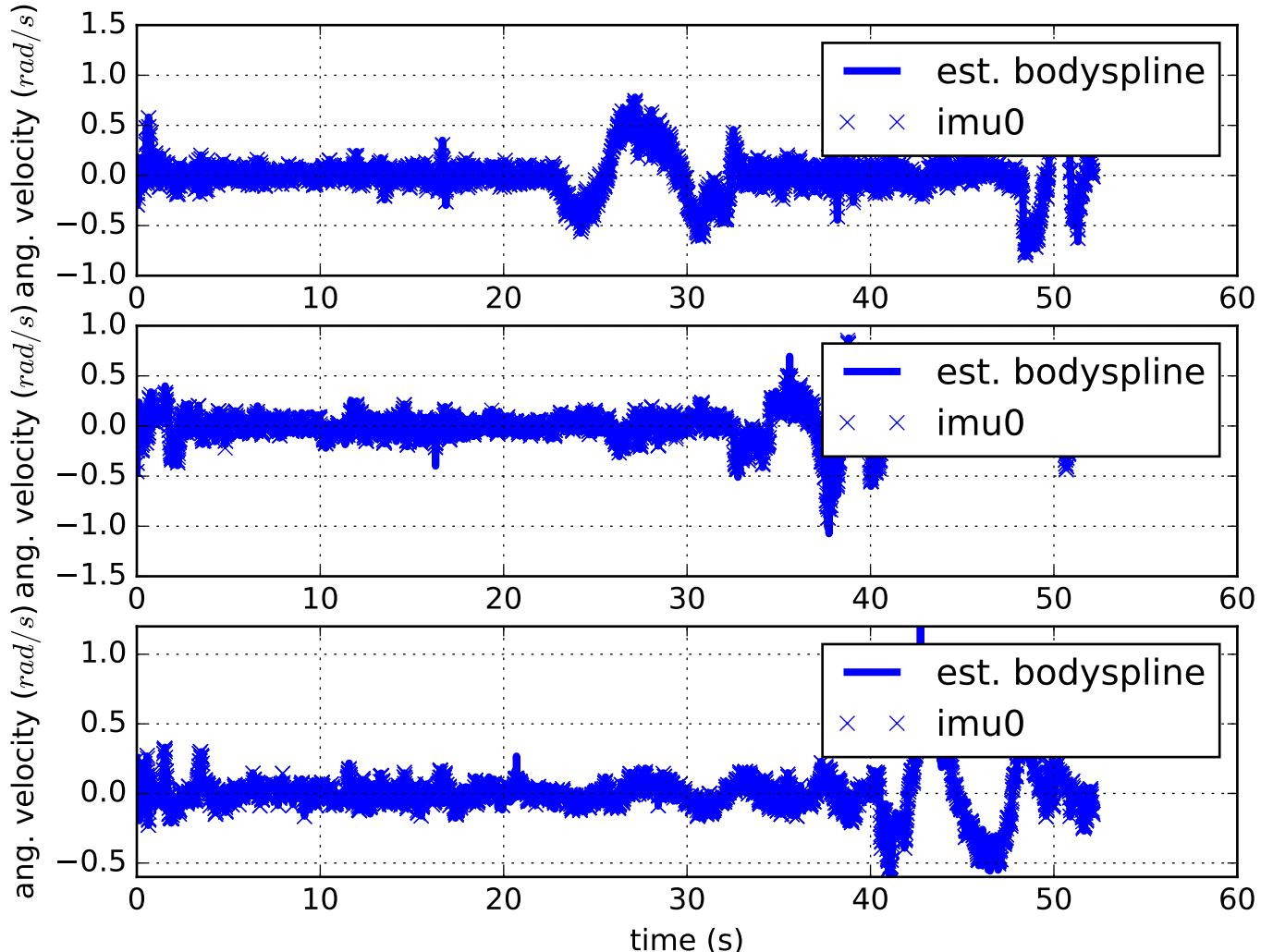
imu0: acceleration error



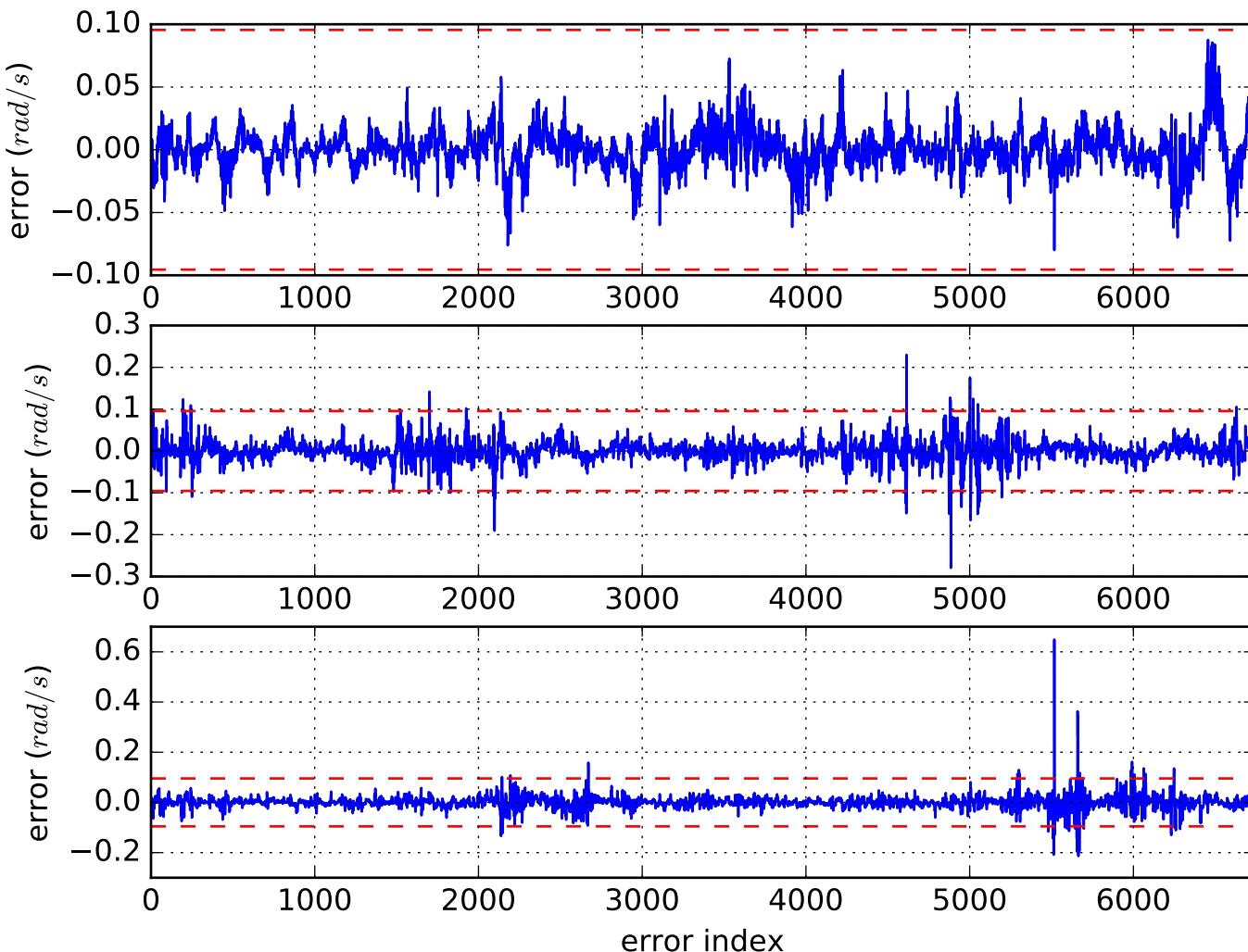
# imu0: estimated accelerometer bias (imu frame)



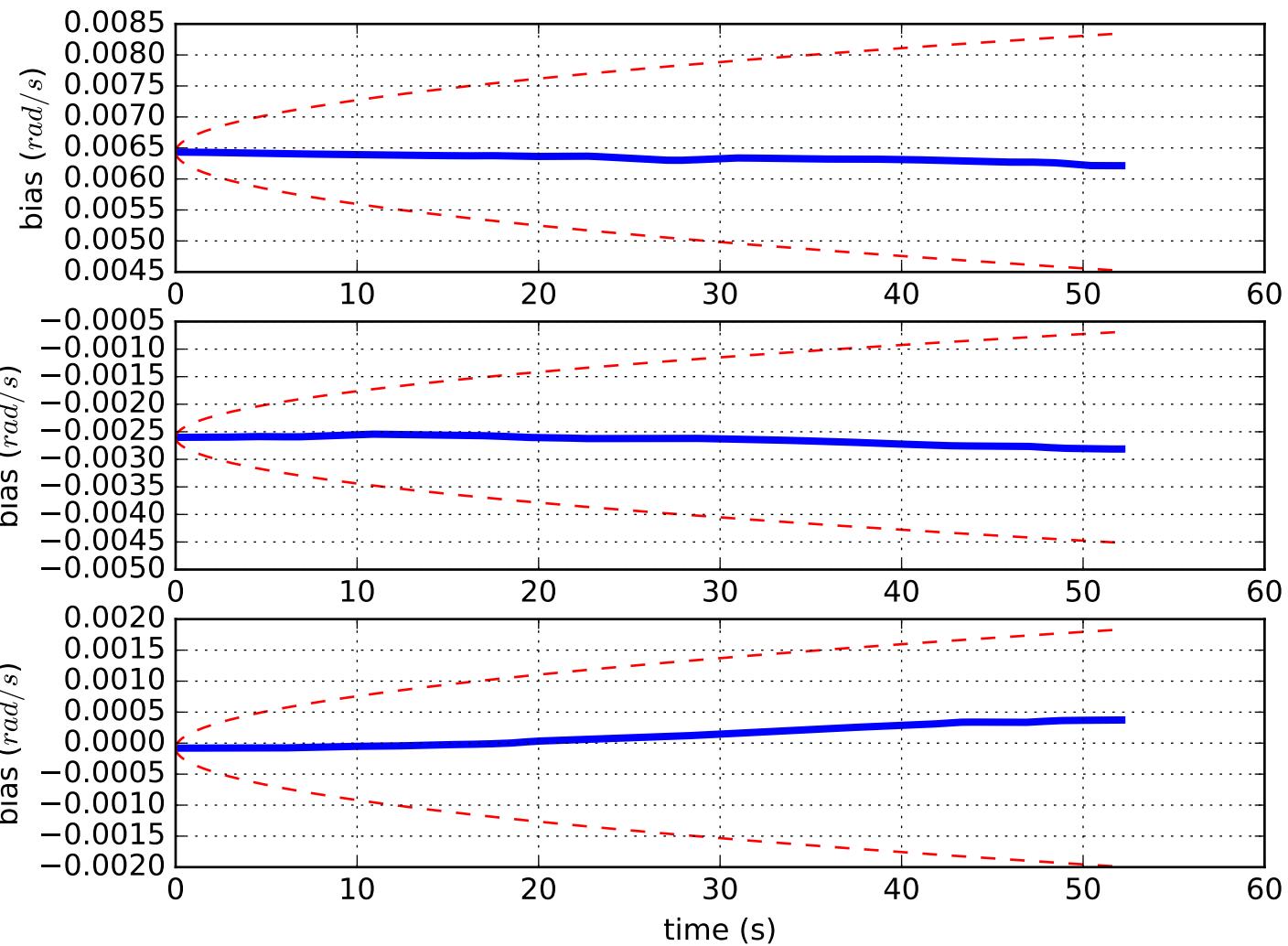
Comparison of predicted and measured angular velocities (body frame)



imu0: angular velocities error



# imu0: estimated gyro bias (imu frame)



cam0: reprojection errors

