

## Calibration results

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### Normalized Residuals

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Reprojection error (cam0): mean 0.06427175205536577, median 0.059211087135558435, std: 0.03616237256637287  
Reprojection error (cam1): mean 0.060721836051888814, median 0.05607430515515787, std: 0.03377663688965242  
Gyroscope error (imu0): mean 0.05570191072121533, median 0.047224558576173394, std: 0.047275110161889705  
Accelerometer error (imu0): mean 0.05408083865384204, median 0.045804173104148964, std: 0.038890690310568736

### Residuals

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Reprojection error (cam0) [px]: mean 0.06427175205536577, median 0.059211087135558435, std: 0.03616237256637287  
Reprojection error (cam1) [px]: mean 0.060721836051888814, median 0.05607430515515787, std: 0.03377663688965242  
Gyroscope error (imu0) [rad/s]: mean 0.0019051228849919146, median 0.001615179553308259, std: 0.0016169085242102234  
Accelerometer error (imu0) [m/s^2]: mean 0.018886410715919396, median 0.015995987622994614, std: 0.013581622780157218

### Transformation (cam0):

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#### T\_ci: (imu0 to cam0):

```
[[ 0.00421444 -0.99994352 -0.00975694  0.04556709]
 [-0.02631049  0.00964277 -0.99960731 -0.05961711]
 [ 0.99964494  0.00446949 -0.02626837 -0.07301594]
 [ 0.          0.          1.          ]]
```

#### T\_ic: (cam0 to imu0):

```
[[ 0.00421444 -0.02631049  0.99964494  0.07122942]
 [-0.99994352  0.00964277  0.00446949  0.04646573]
 [-0.00975694 -0.99960731 -0.02626837 -0.06106711]
 [ 0.          0.          1.          ]]
```

timeshift cam0 to imu0: [s] (t\_imu = t\_cam + shift)  
-0.018321670704442326

### Transformation (cam1):

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T\_ci: (imu0 to cam1):  
[[ 0.00412257 -0.99994433 -0.00971318 -0.04952798]  
[-0.0268164 0.00959922 -0.99959429 -0.05961468]  
[ 0.99963187 0.00438137 -0.02677533 -0.07307615]  
[ 0. 0. 0. 1. ]]

T\_ic: (cam1 to imu0):  
[[ 0.00412257 -0.0268164 0.99963187 0.07165478]  
[-0.99994433 0.00959922 0.00438137 -0.04863279]  
[-0.00971318 -0.99959429 -0.02677533 -0.06202821]  
[ 0. 0. 0. 1. ]]

timeshift cam1 to imu0: [s] (t\_imu = t\_cam + shift)  
-0.018322907247134753

Baselines:

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Baseline (cam0 to cam1):  
[[ 0.99999999 -0.00004133 -0.00009299 -0.09510432]  
[ 0.00004129 0.99999987 -0.00050627 -0.00003643]  
[ 0.00009301 0.00050626 0.99999987 -0.00003428]  
[ 0. 0. 0. 1. ]]  
baseline norm: 0.09510433297679358 [m]

Gravity vector in target coords: [m/s^2]  
[-0.23574368 -9.05045699 -3.7685642 ]

Calibration configuration

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cam0

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Camera model: pinhole  
Focal length: [421.38000085987886, 422.4509480417162]  
Principal point: [420.2336221638458, 243.53281743681666]  
Distortion model: radtan  
Distortion coefficients: [0.0008538893074769908, -0.0019457899639230356, 0.00017295710922906,  
0.000851002177492625]  
Type: checkerboard  
Rows  
Count: 11  
Distance: 0.02 [m]  
Cols  
Count: 8  
Distance: 0.02 [m]

cam1

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Camera model: pinhole  
Focal length: [421.67642673226743, 422.64905502918026]  
Principal point: [420.5247685321362, 243.56185880626225]  
Distortion model: radtan  
Distortion coefficients: [0.002640197580778735, -0.004652222711908192, 2.0092232460383594e-05,  
0.0006108638687212083]  
Type: checkerboard  
Rows  
Count: 11  
Distance: 0.02 [m]  
Cols  
Count: 8  
Distance: 0.02 [m]

IMU configuration

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IMU0:

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Model: calibrated

Update rate: 200.0

Accelerometer:

Noise density: 0.02469397557789561

Noise density (discrete): 0.3492255517116996

Random walk: 0.00026613450113975324

Gyroscope:

Noise density: 0.0024184544004491014

Noise density (discrete): 0.03420211013096011

Random walk: 4.52857120638716e-05

T\_ib (imu0 to imu0)

[[1. 0. 0. 0.]

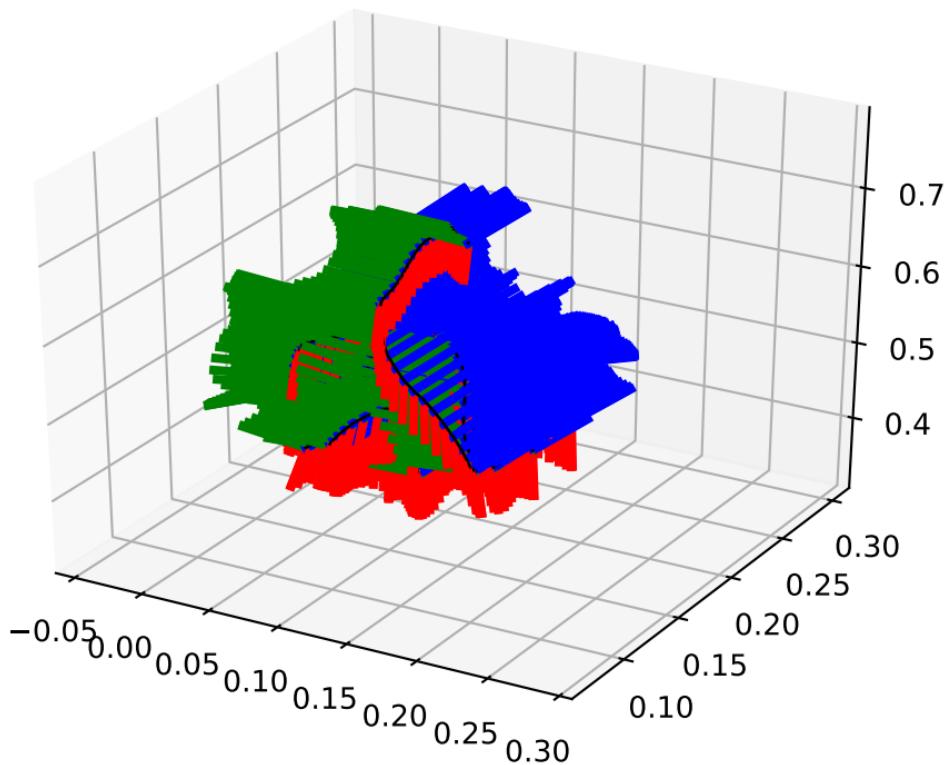
[0. 1. 0. 0.]

[0. 0. 1. 0.]

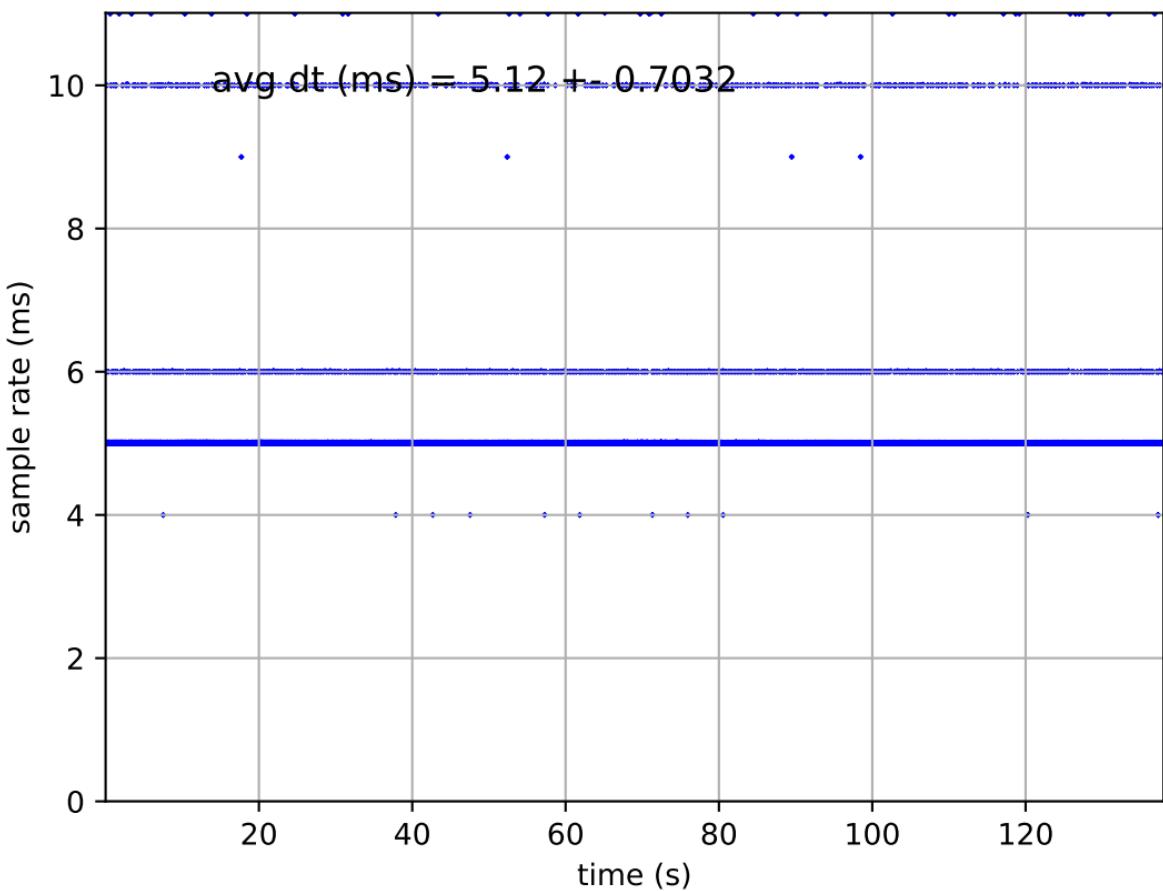
[0. 0. 0. 1.]]

time offset with respect to IMU0: 0.0 [s]

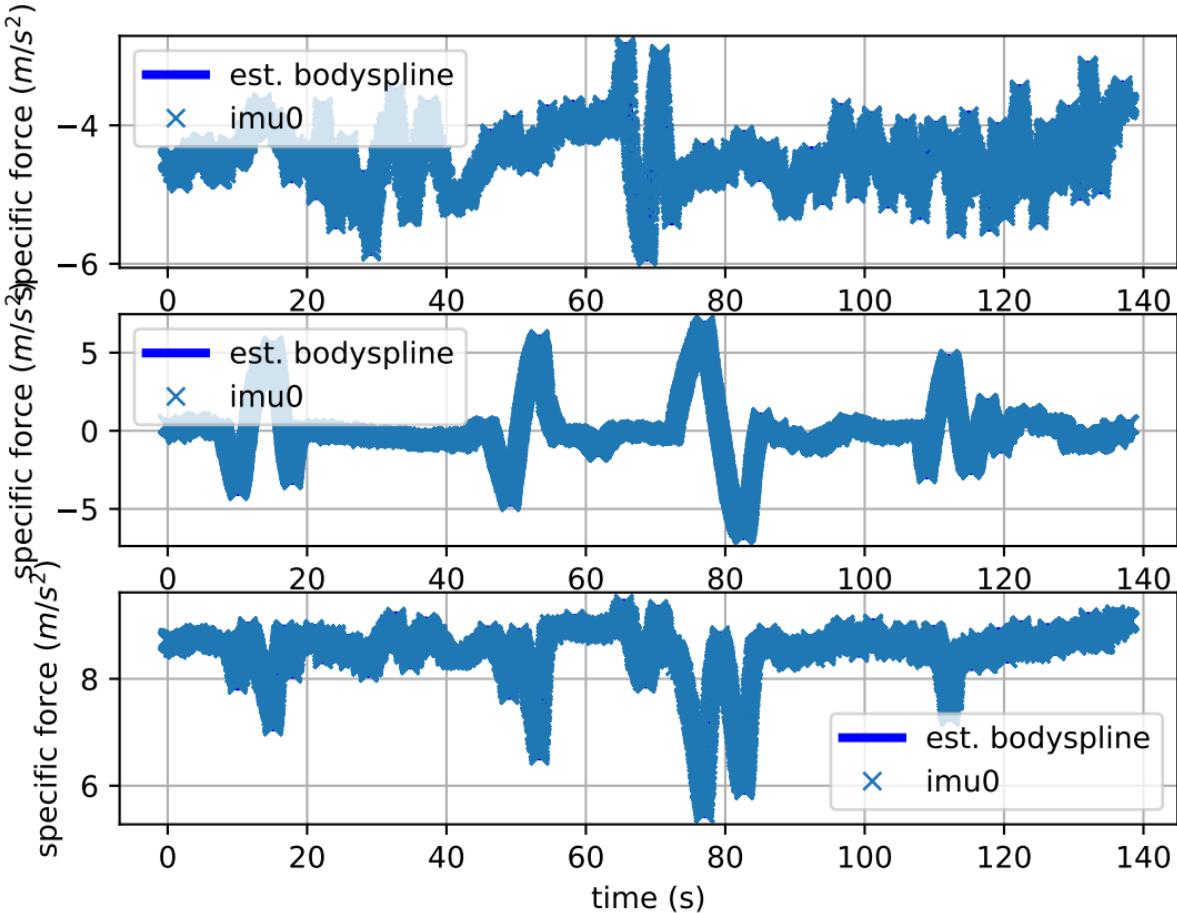
imu0: estimated poses



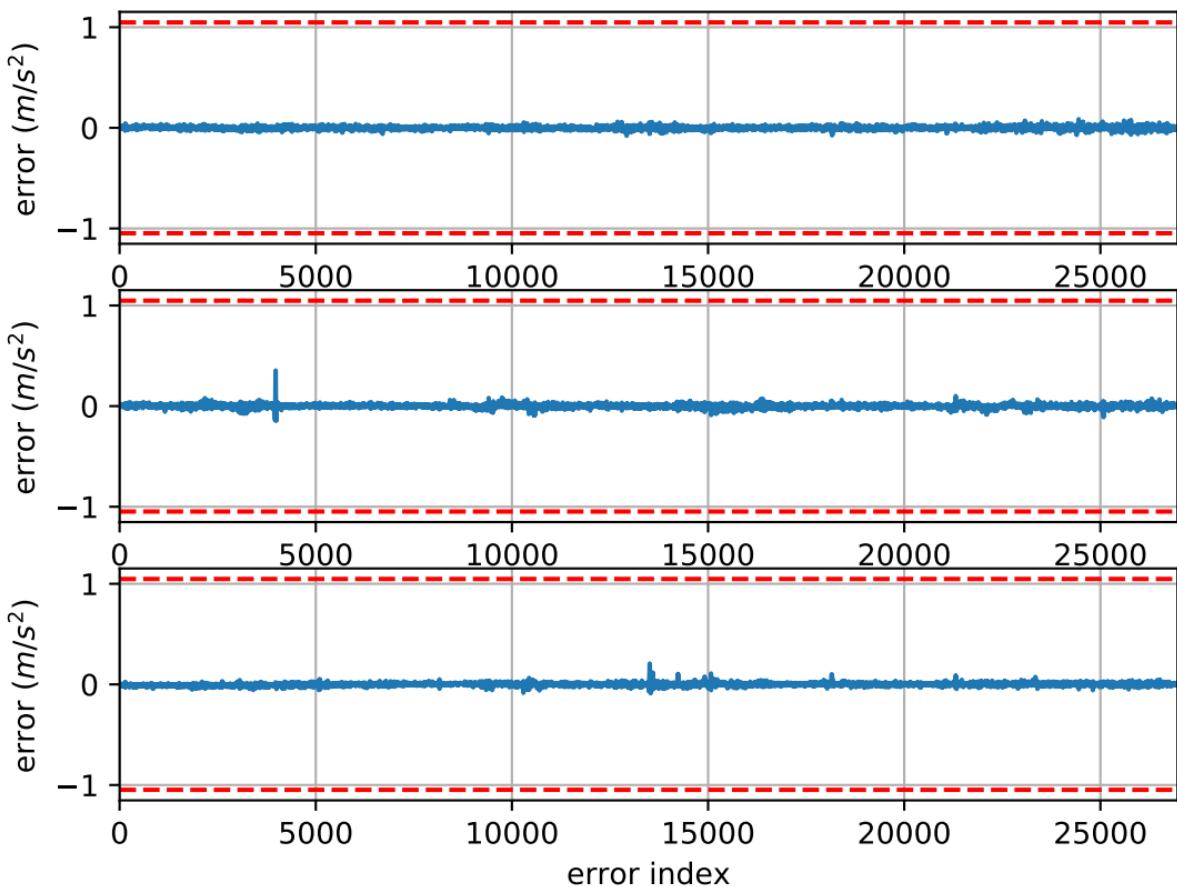
# imu0: sample inertial rate



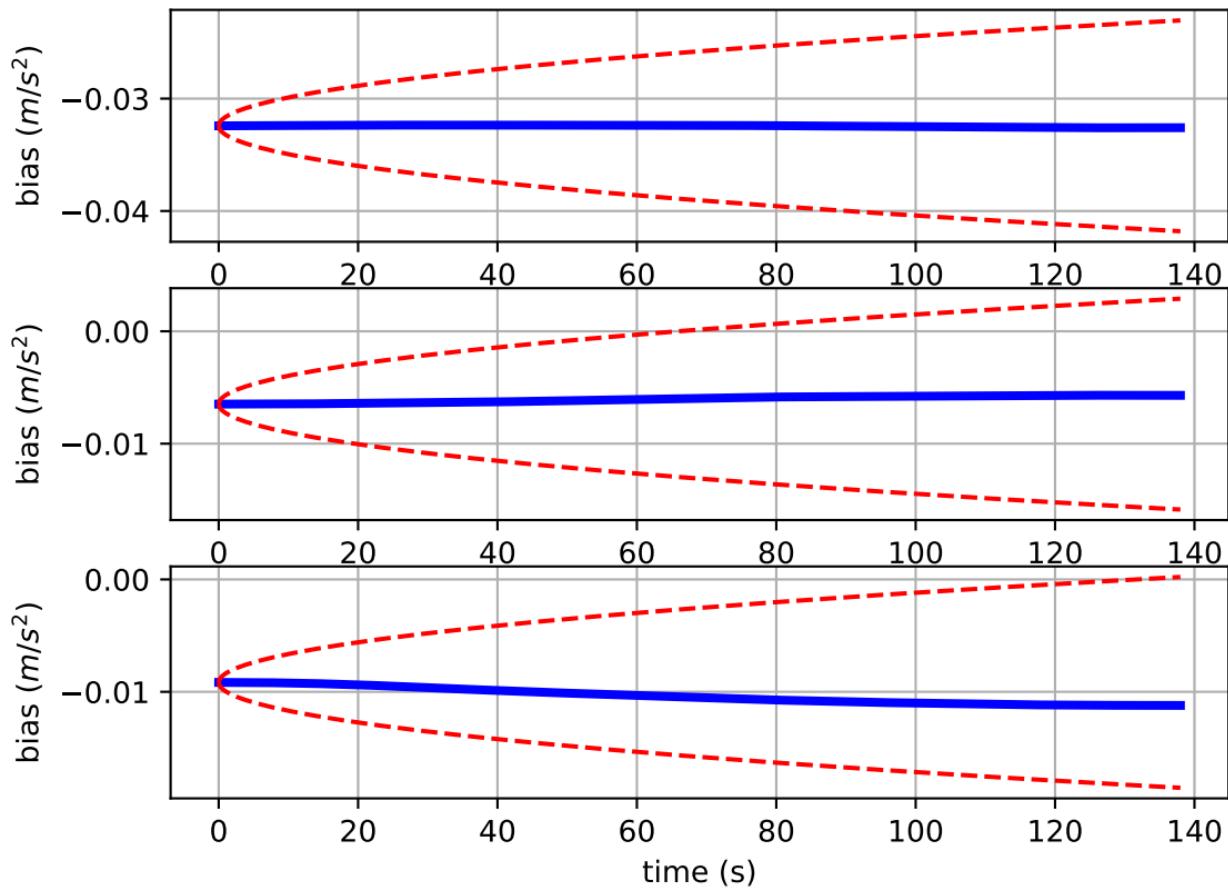
# Comparison of predicted and measured specific force (imu0 frame)



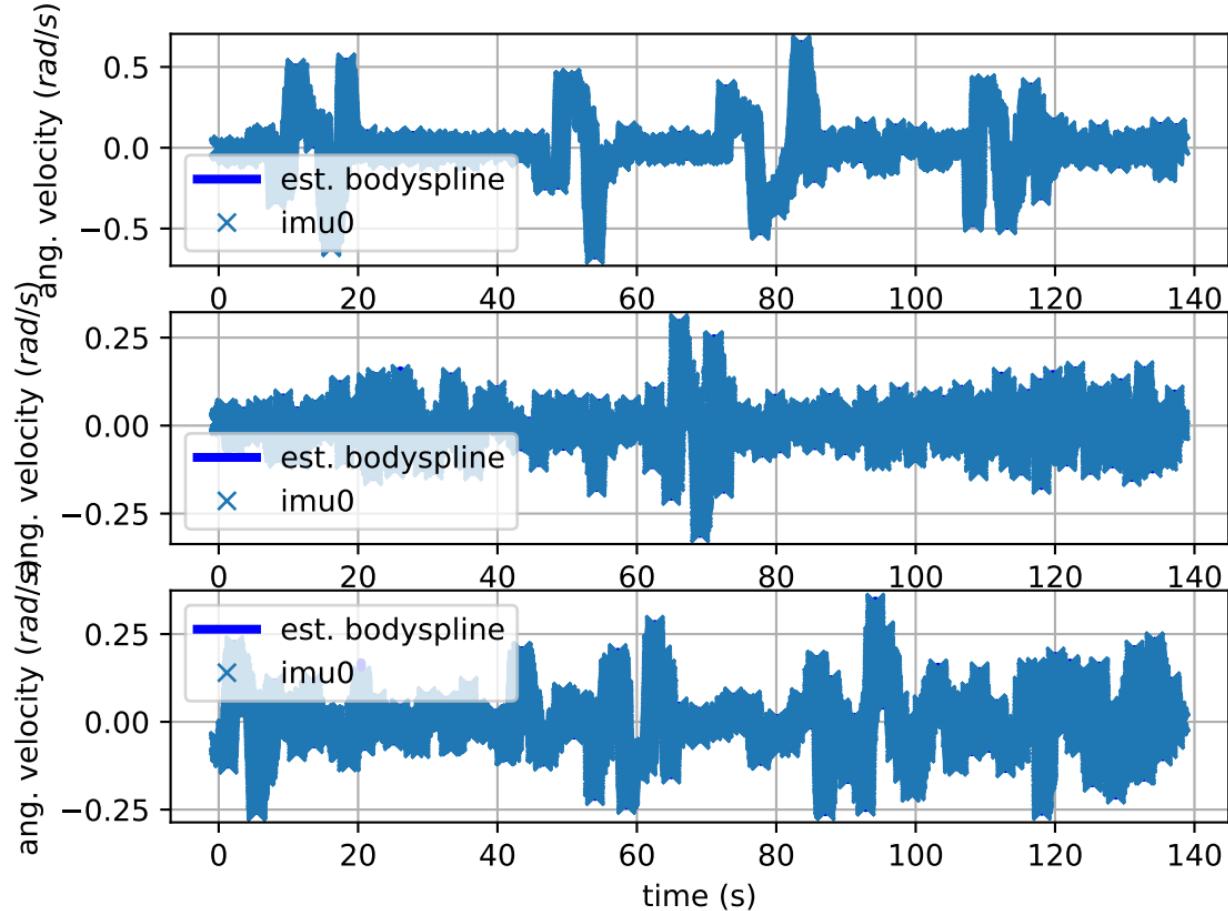
# imu0: acceleration error



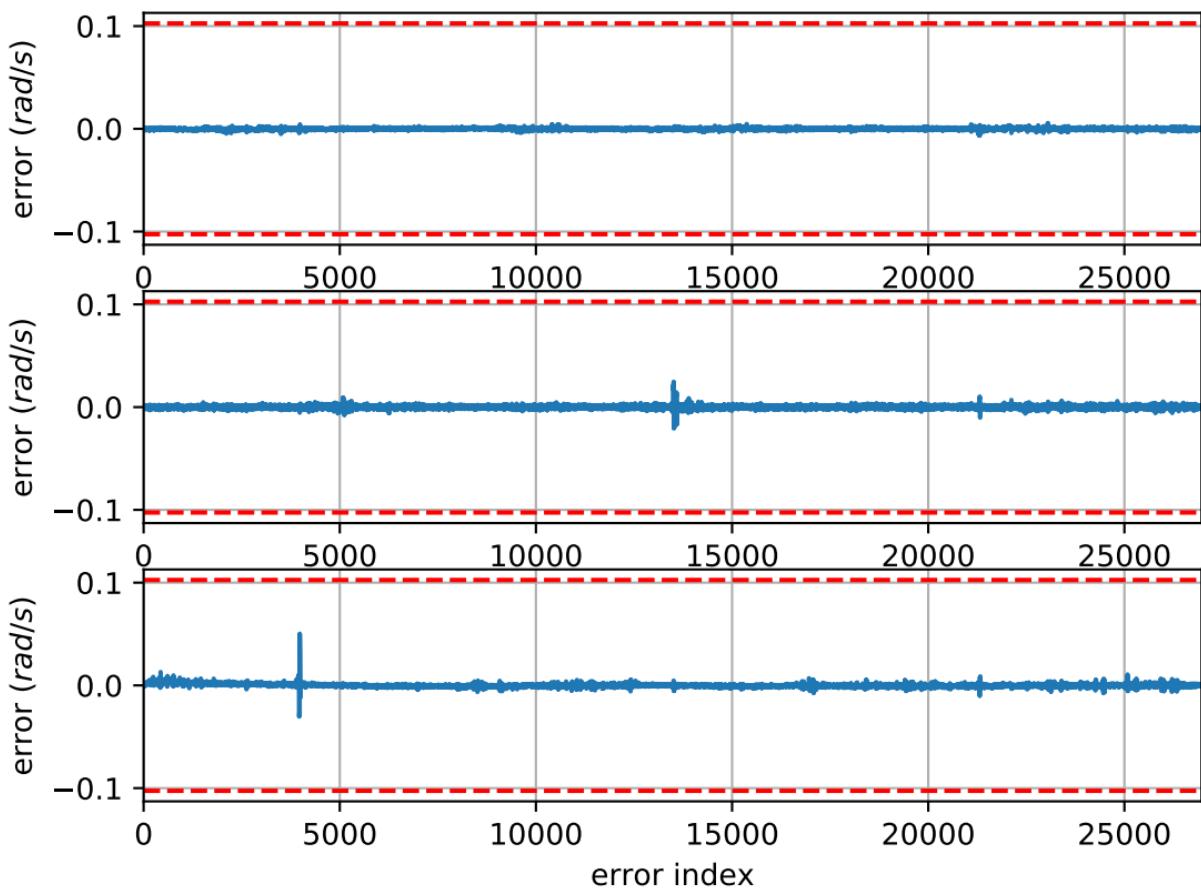
# imu0: estimated accelerometer bias (imu frame)



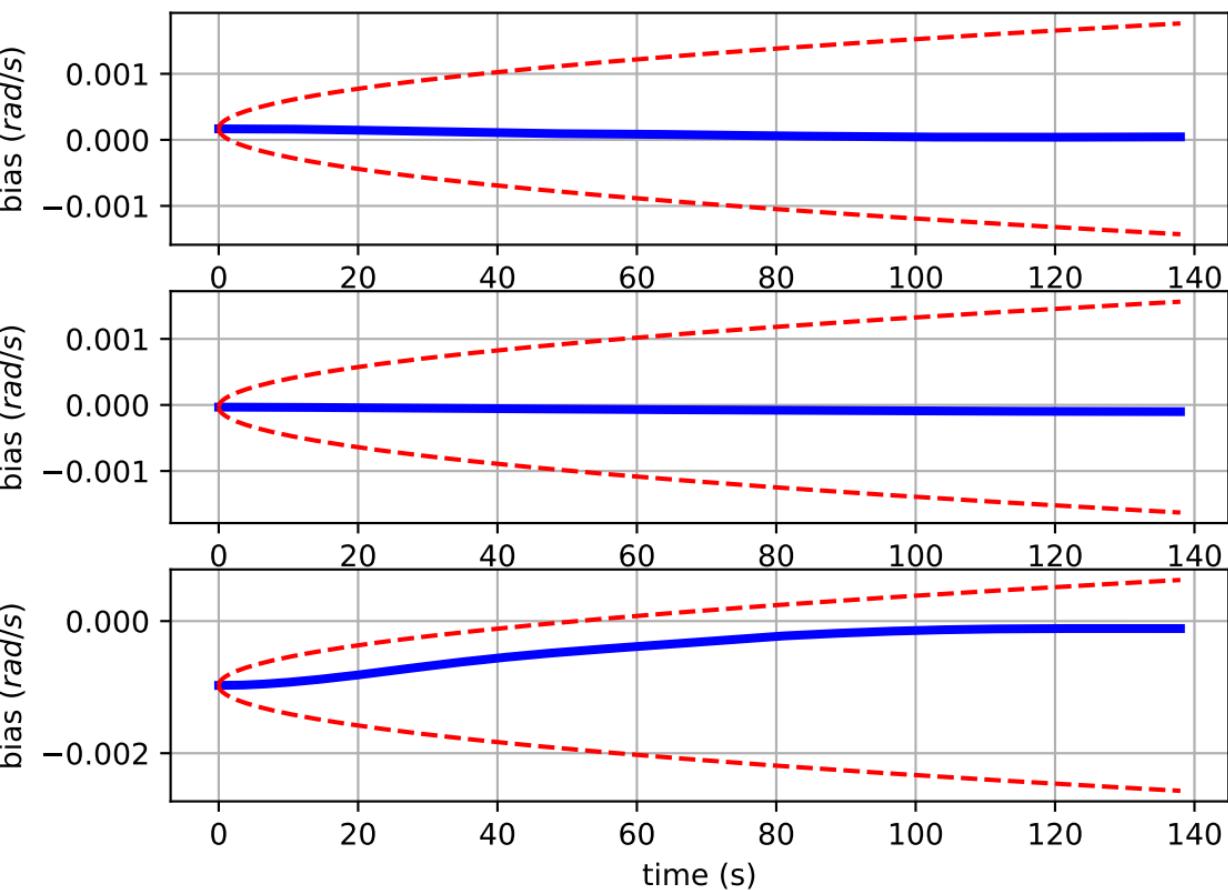
# Comparison of predicted and measured angular velocities (body frame)



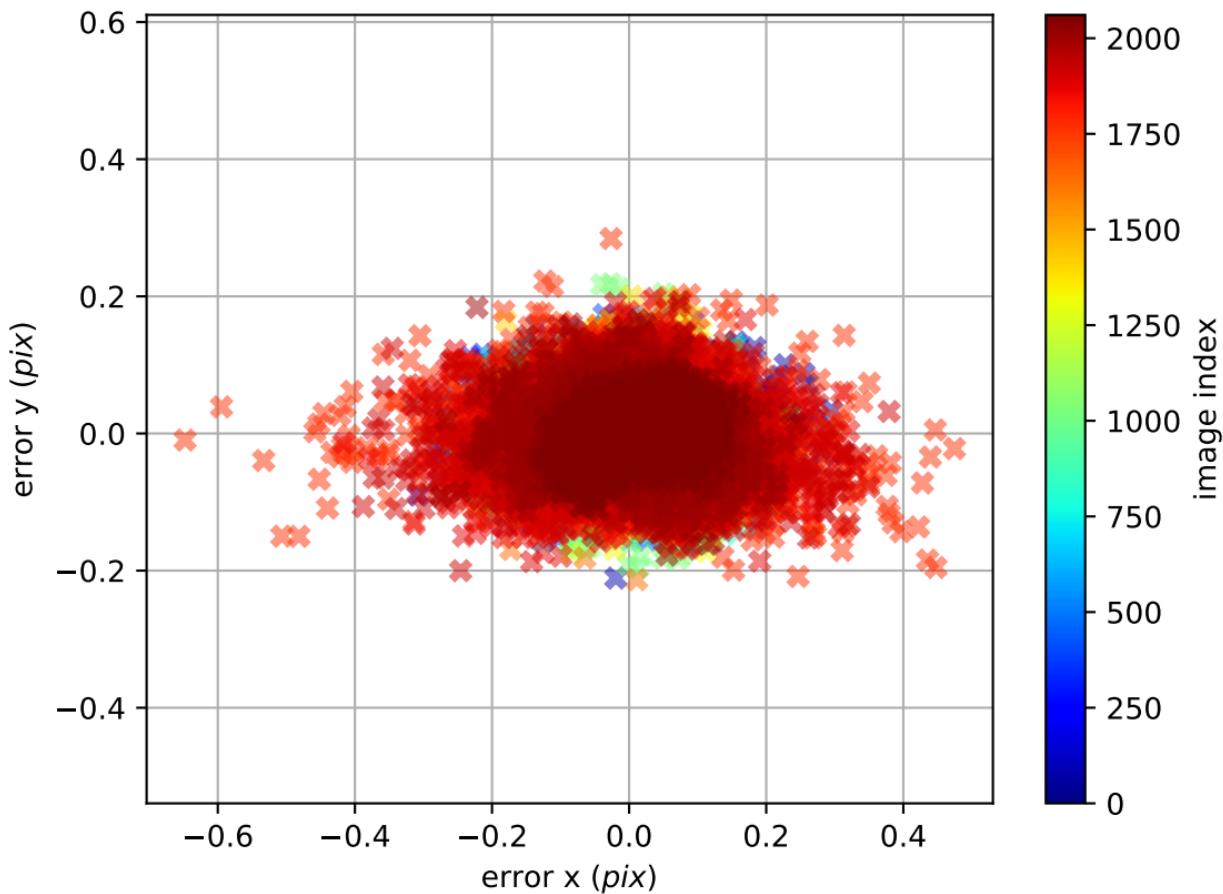
# imu0: angular velocities error



# imu0: estimated gyro bias (imu frame)



cam0: reprojection errors



cam1: reprojection errors

