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Calibration results
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Normalized Residuals
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Reprojection error (cam0):     mean 0.1904386684156189, median 0.1532184511653985, std: 0.1477919686563656
Gyroscope error (imu0):        mean 0.28490482126333866, median 0.22183048783297216, std: 0.23462381705707533
Accelerometer error (imu0):    mean 0.1760089946274486, median 0.1395529567777894, std: 0.14177350629781066

Residuals
----------------------------
Reprojection error (cam0) [px]:     mean 0.1904386684156189, median 0.1532184511653985, std: 0.1477919686563656
Gyroscope error (imu0) [rad/s]:     mean 0.0023698862076309136, median 0.0018452232967355762, std:
0.001951640360312959
Accelerometer error (imu0) [m/s^2]: mean 0.0301353626805335, median 0.023893545750551397, std:
0.02427373691792649

Transformation (cam0):
-----------------------
T_ci:  (imu0 to cam0):
[[-0.01529419 -0.99982353 -0.01090834 -0.00891845]
[-0.99985981  0.01521856  0.00698276  0.00130459]
[-0.00681552  0.0110136  -0.99991612 -0.10432667]
[ 0.          0.          0.          1.        ]]

T_ic:  (cam0 to imu0):
[[-0.01529419 -0.99985981 -0.00681552  0.00045697]
[-0.99982353  0.01521856  0.0110136  -0.00778772]
[-0.01090834  0.00698276 -0.99991612 -0.10442431]
[ 0.          0.          0.          1.        ]]

timeshift cam0 to imu0: [s] (t_imu = t_cam + shift)
-0.016334674460290674


Gravity vector in target coords: [m/s^2]
[-0.1456764  -9.80543194  0.02656479]
```

Calibration configuration
==========

cam0

Camera model: pinhole
Focal length: [635.4374739716663, 633.1552214084261]
Principal point: [486.7922140547102, 289.11649690690723]
Distortion model: radtan
Distortion coefficients: [0.016793426316506002, -0.04645794062818148, 0.0004956179656609223, 0.0010514434216669702]
Type: aprilgrid
Tags:
Rows: 6
Cols: 6
Size: 0.06 [m]
Spacing 0.018 [m]

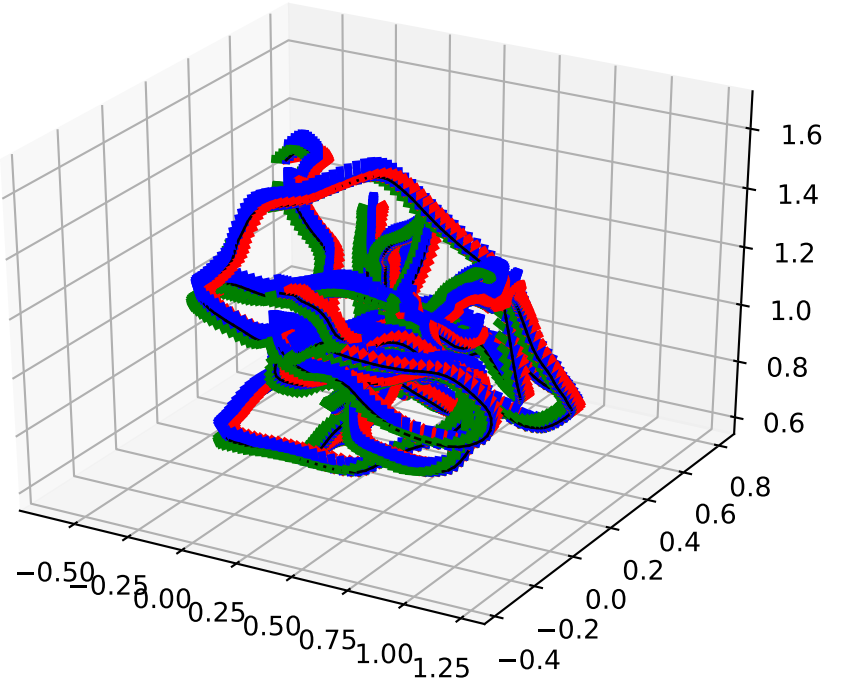
IMU configuration
==========

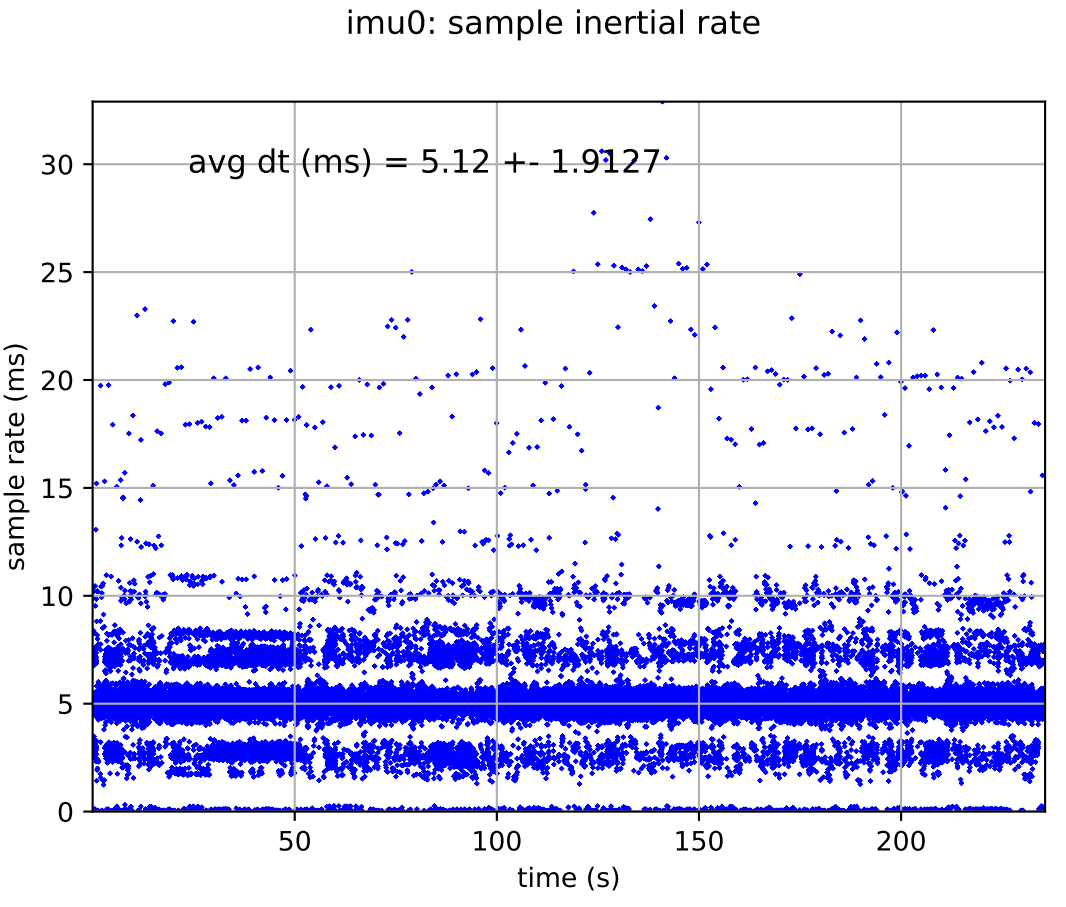
IMU0:

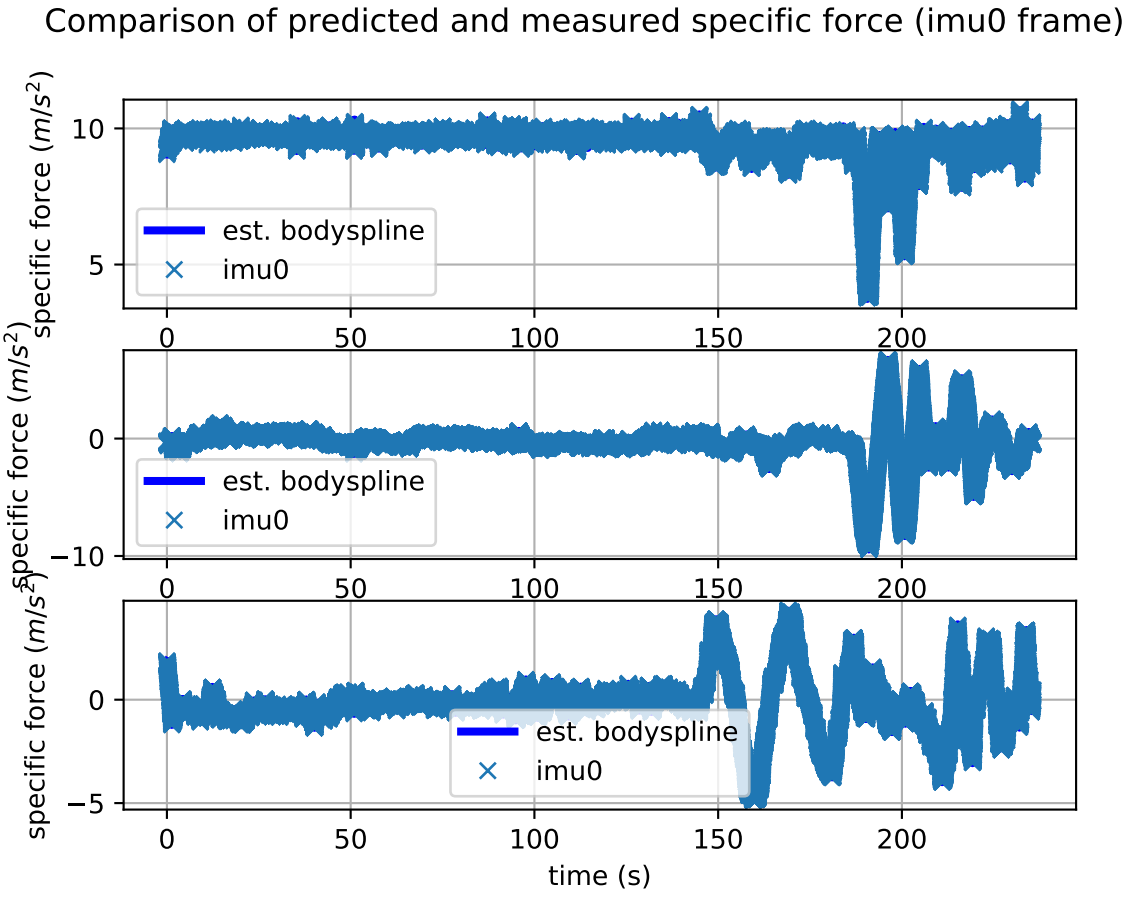
Model: scale-misalignment
Update rate: 200.0
Accelerometer:
Noise density: 0.01210672179
Noise density (discrete): 0.17121490151295873
Random walk: 0.001431059201817203
Gyroscope:
Noise density: 0.00058818331
Noise density (discrete): 0.008318168141634986
Random walk: 3.664343e-05

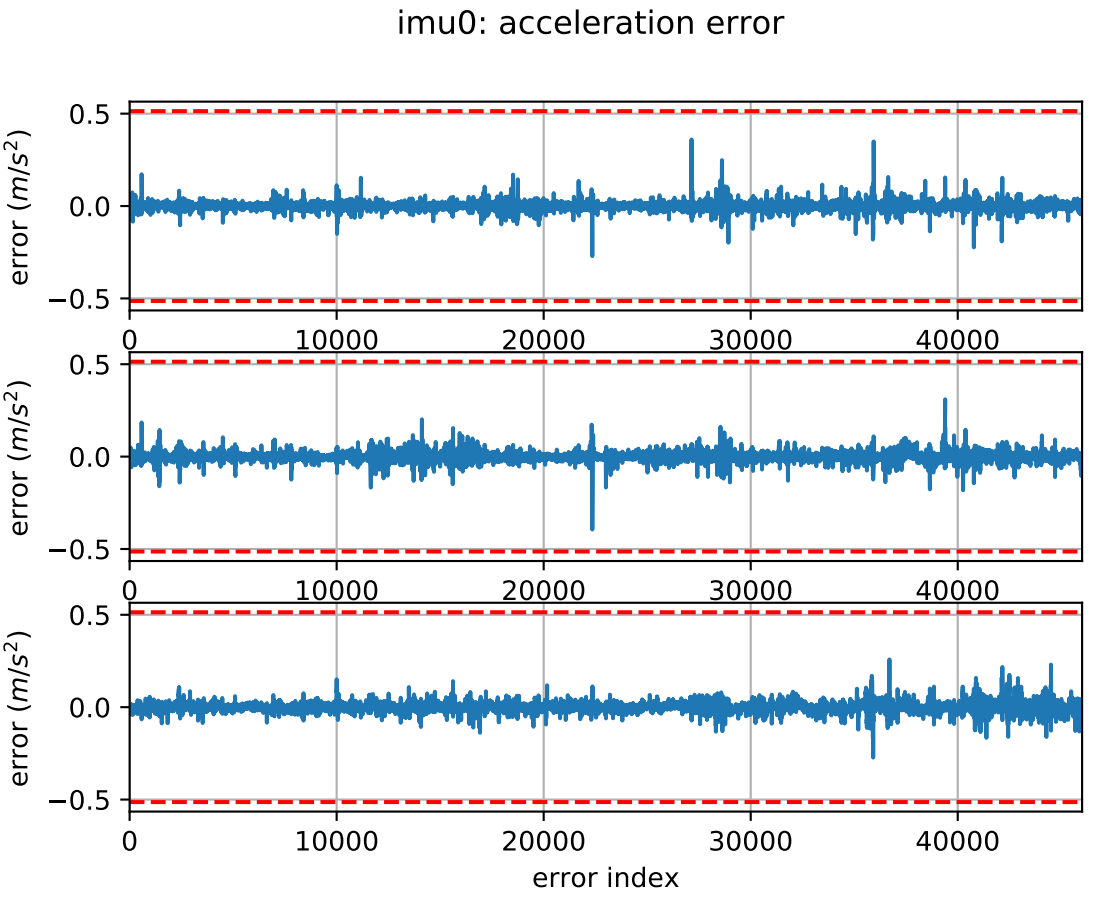
```
T_ib (imu0 to imu0)
[[1. 0. 0. 0.]
[0. 1. 0. 0.]
[0. 0. 1. 0.]
[0. 0. 0. 1.]]
time offset with respect to IMU0: 0.0 [s]
Gyroscope:
M:
[[ 0.99396402  0.          0.        ]
[ 0.00129248  0.98394793  0.        ]
[-0.00299226 -0.01472881  0.99298956]]
A [(rad/s)/(m/s^2)]:
[[ 0.00020799  0.0000015   0.00000162]
[ 0.0002019  -0.00007321 -0.00000661]
[-0.00023675  0.00011629 -0.00003586]]
C_gyro_i:
[[ 0.99998427  0.00102558 -0.00551468]
[-0.00106476  0.99997418 -0.00710647]
[ 0.00550725  0.00711223  0.99995954]]
Accelerometer:
M:
[[ 0.99755725  0.          0.        ]
[-0.0020025   0.9988672   0.        ]
[ 0.00751925  0.00286401  1.00264196]]
```

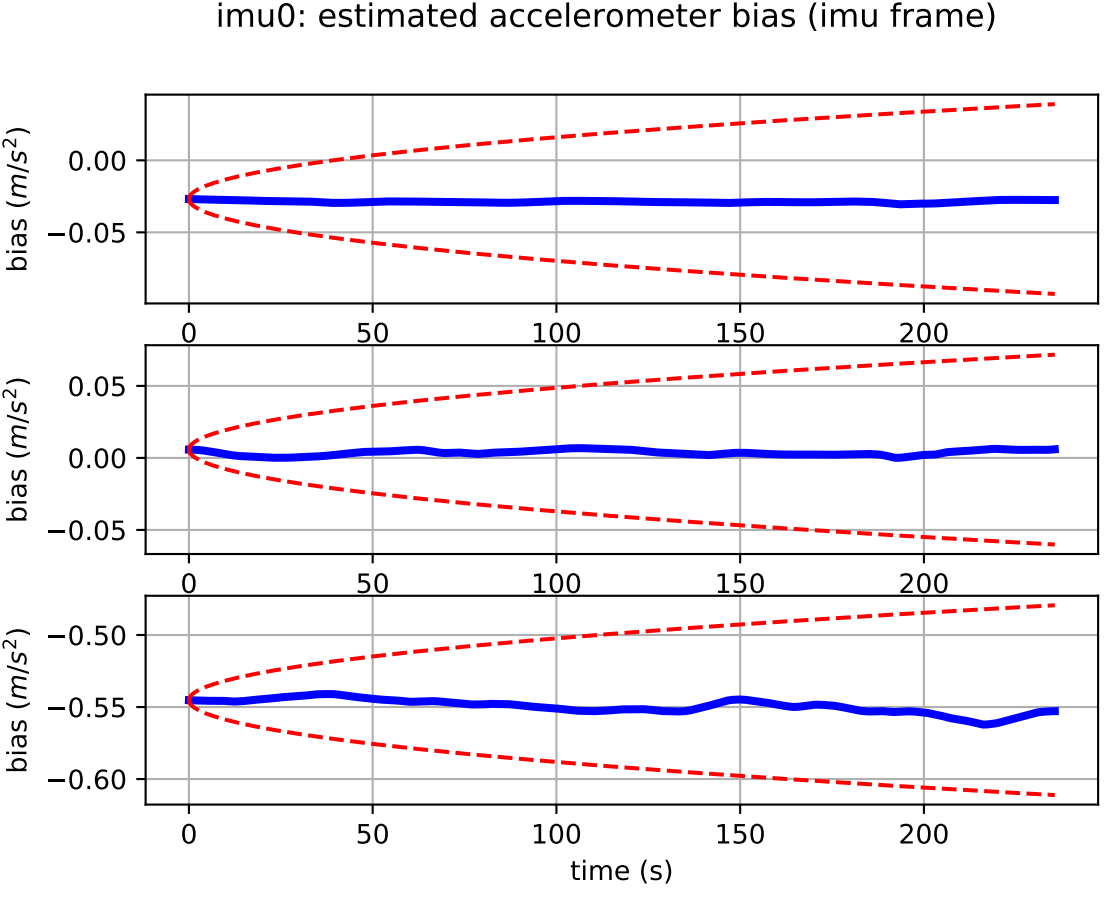
imu0: estimated poses

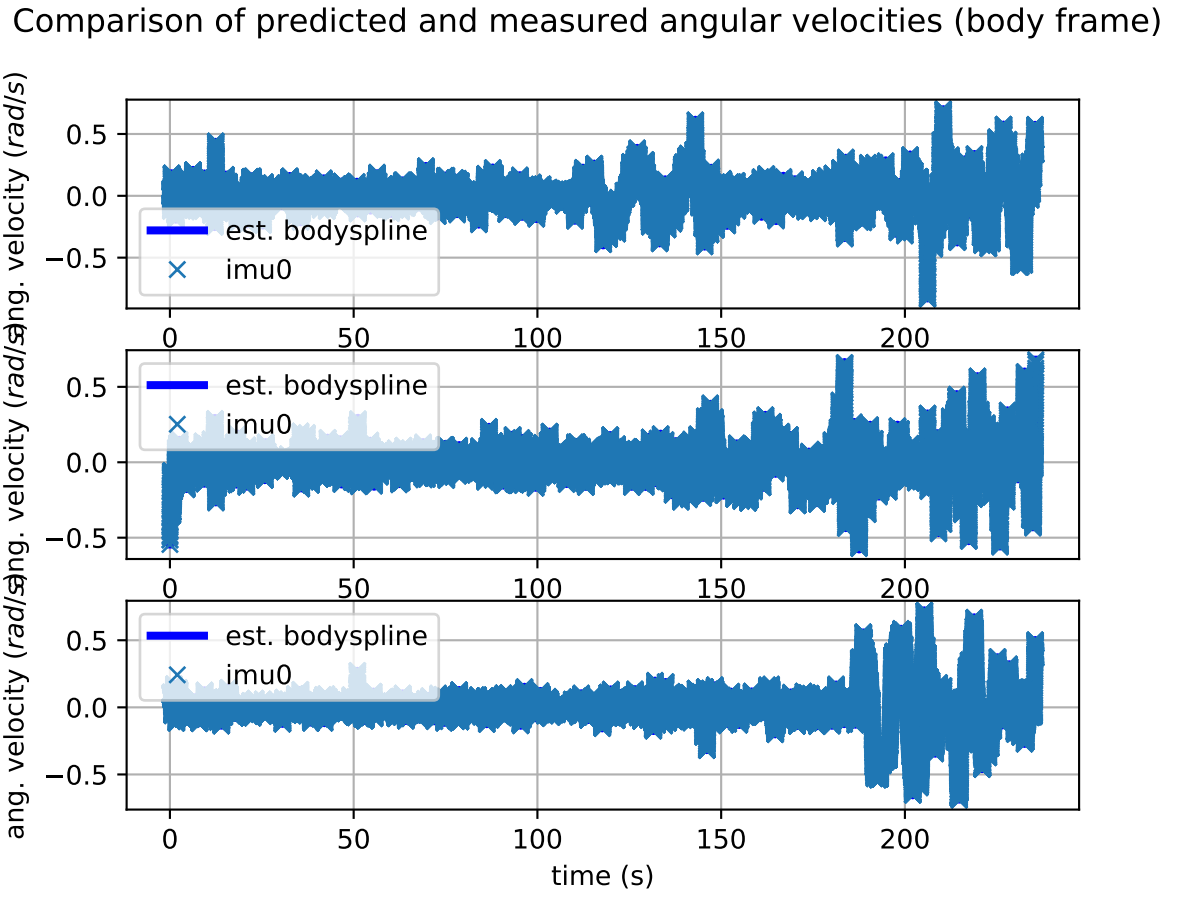


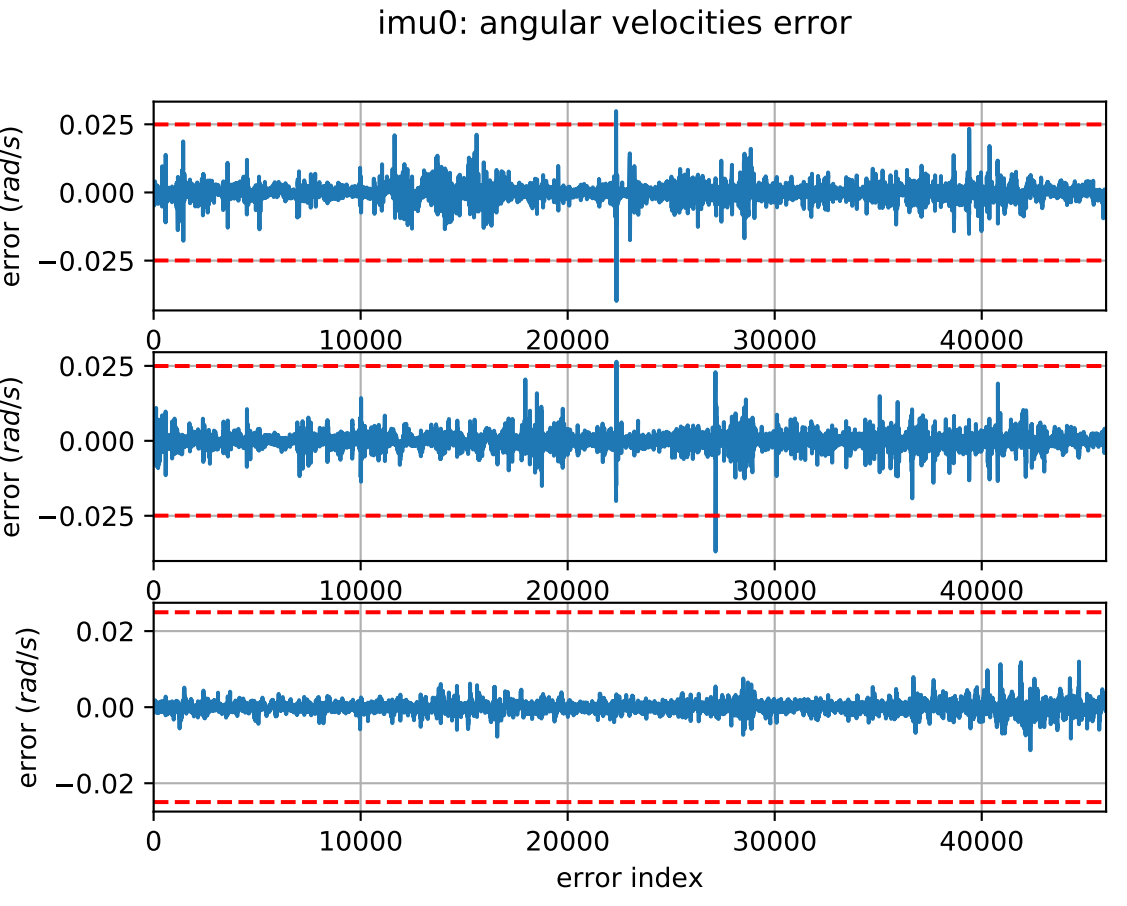

imu0: sample inertial rate
avg dt (ms) = 5.12 +- 1.9127
sample rate (ms)
time (s)
0
5
10
15
20
25
30
50
100
150
200

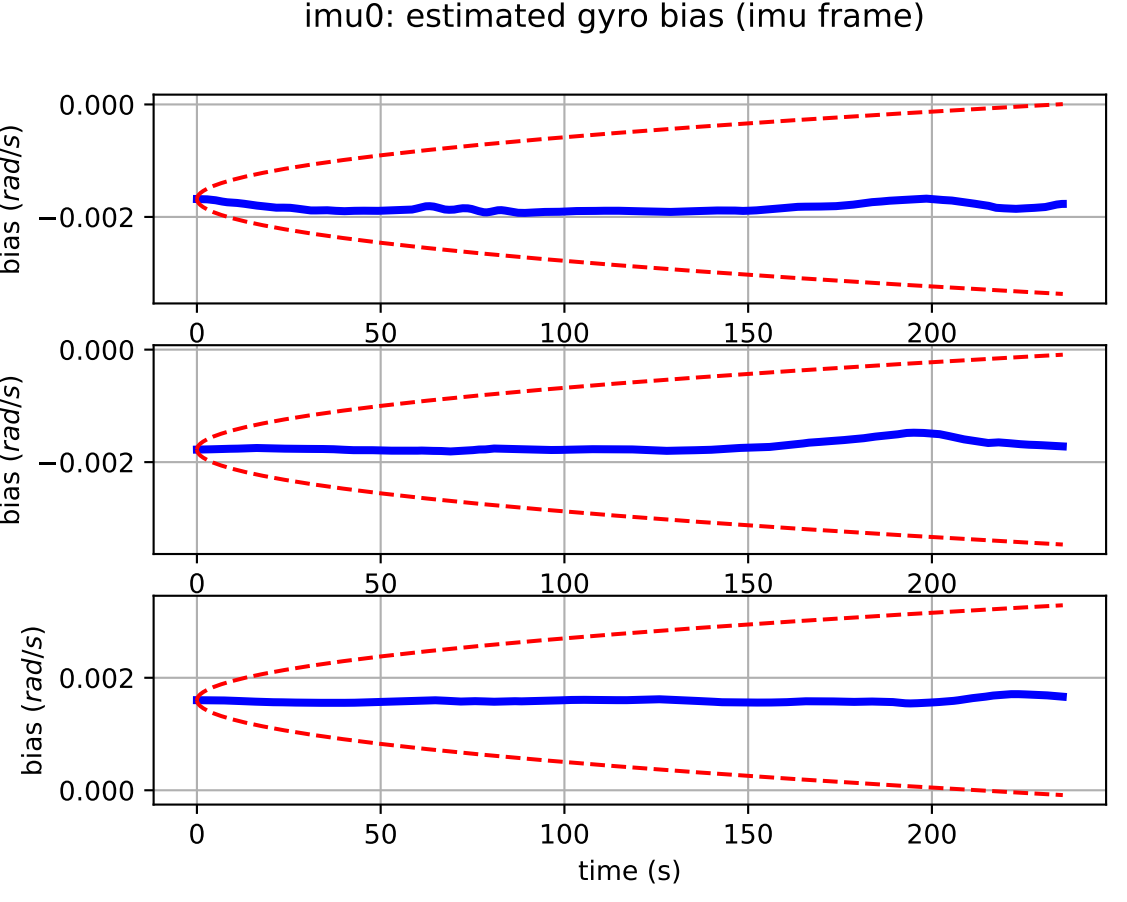

Comparison of predicted and measured specific force (imu0 frame)
specific force (m/s^2)
10
5
est. bodyspline
imu0
0
50
100
150
200
specific force (m/s^2)
0
−10
est. bodyspline
imu0
0
50
100
150
200
specific force (m/s^2)
0
−5
est. bodyspline
imu0
0
50
100
150
200
time (s)

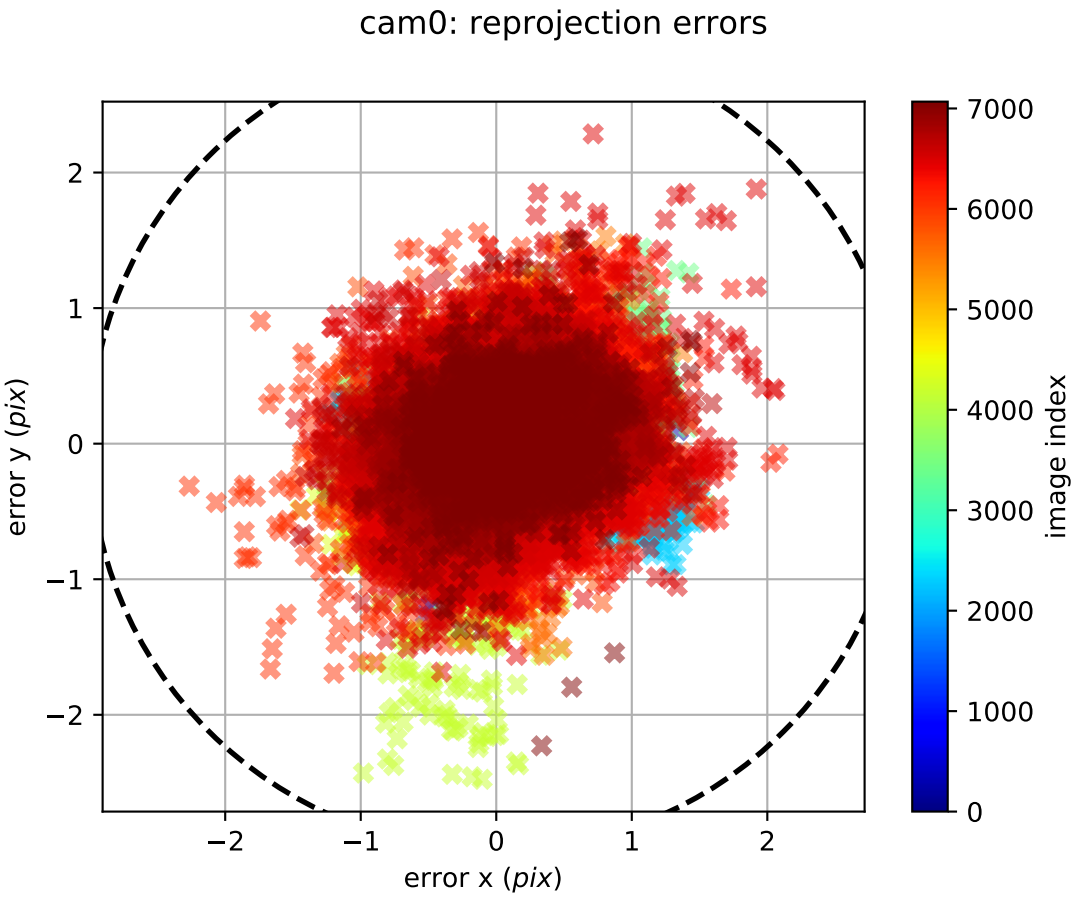

imu0: acceleration error
error (m/s^2)
0.5
0.0
−0.5
0
10000
20000
30000
40000
error index


imu0: estimated accelerometer bias (imu frame)
bias (m/s^2)
0.00
−0.05
0
50
100
150
200
bias (m/s^2)
0.05
0.00
−0.05
0
50
100
150
200
bias (m/s^2)
−0.50
−0.55
−0.60
0
50
100
150
200
time (s)


Comparison of predicted and measured angular velocities (body frame)
ang. velocity (rad/s)
ang. velocity (rad/s)
ang. velocity (rad/s)
est. bodyspline
imu0
est. bodyspline
imu0
est. bodyspline
imu0
0.5
0.0
−0.5
0
50
100
150
200
time (s)


imu0: angular velocities error
error (rad/s)
0.025
0.000
−0.025
0
10000
20000
30000
40000
error (rad/s)
0.025
0.000
−0.025
0
10000
20000
30000
40000
error (rad/s)
0.02
0.00
−0.02
0
10000
20000
30000
40000
error index


imu0: estimated gyro bias (imu frame)
0.000
−0.002
bias (rad/s)
0
50
100
150
200
0.000
−0.002
bias (rad/s)
0
50
100
150
200
0.002
0.000
bias (rad/s)
0
50
100
150
200
time (s)


cam0: reprojection errors
error y (pix)
error x (pix)
image index
2
1
0
−1
−2
−2
−1
0
1
2
7000
6000
5000
4000
3000
2000
1000
0