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Calibration results
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Normalized Residuals
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Reprojection error (cam0):     mean 0.3357639904723767, median 0.23316938687177174, std: 0.3234351294502648
Gyroscope error (imu0):        mean 0.7450367196846471, median 0.6966207591002127, std: 0.36223672384251343
Accelerometer error (imu0):    mean 0.3942541699370429, median 0.34429648049633305, std: 0.28711229035368724

Residuals
----------------------------
Reprojection error (cam0) [px]:     mean 0.3357639904723767, median 0.23316938687177174, std: 0.3234351294502648
Gyroscope error (imu0) [rad/s]:     mean 0.005376661941752356, median 0.005027261374277111, std:
0.002614132103198181
Accelerometer error (imu0) [m/s^2]: mean 0.03509669371507877, median 0.030649436441189684, std:
0.02555887263789052

Transformation (cam0):
-----------------------
T_ci:  (imu0 to cam0):
[[ 0.99997051  0.00767917 -0.00007201  0.01873877]
 [ 0.0076795  -0.9999081   0.01117206 -0.06843921]
 [ 0.00001378 -0.01117228 -0.99993759 -0.08705851]
 [ 0.          0.          0.          1.        ]]

T_ic:  (cam0 to imu0):
[[ 0.99997051  0.0076795   0.00001378 -0.01821143]
 [ 0.00767917 -0.9999081  -0.01117228 -0.06954946]
 [-0.00007201  0.01117206 -0.99993759 -0.08628712]
 [ 0.          0.          0.          1.        ]]

timeshift cam0 to imu0: [s] (t_imu = t_cam + shift)
-0.029215947914802597


Gravity vector in target coords: [m/s^2]
[-0.06789619 -9.80626031  0.03273608]
```

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

cam0

Camera model: pinhole
Focal length: [631.8121282110981, 630.5950123045492]
Principal point: [475.2380600438913, 297.61583384199184]
Distortion model: radtan
Distortion coefficients: [0.024695570573106992, -0.029349201691012974, 0.00032864355328926395, 0.00032525153518354 21]
Type: aprilgrid
Tags:
Rows: 6
Cols: 6
Size: 0.06 [m]
Spacing 0.018 [m]

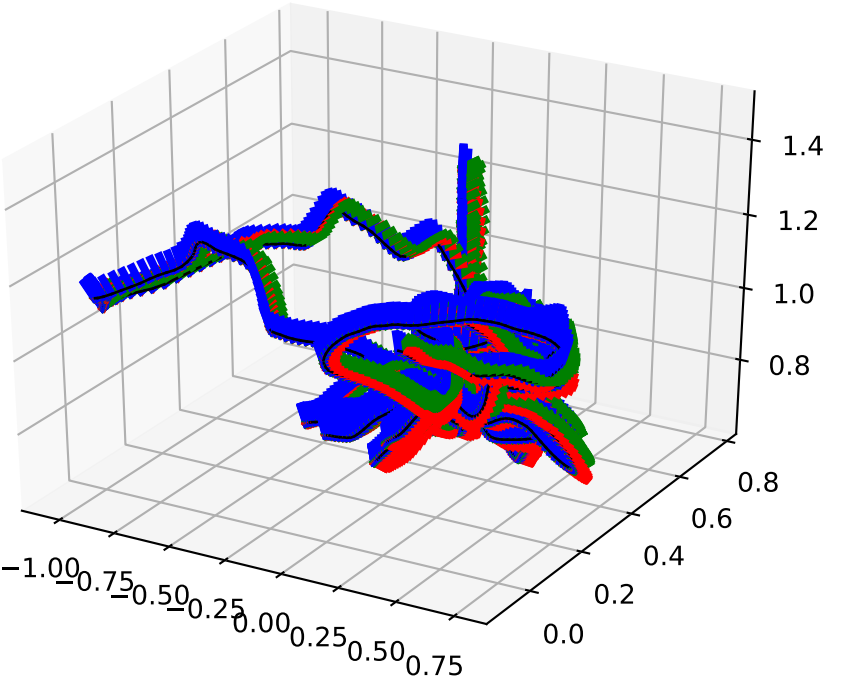
IMU configuration
==========

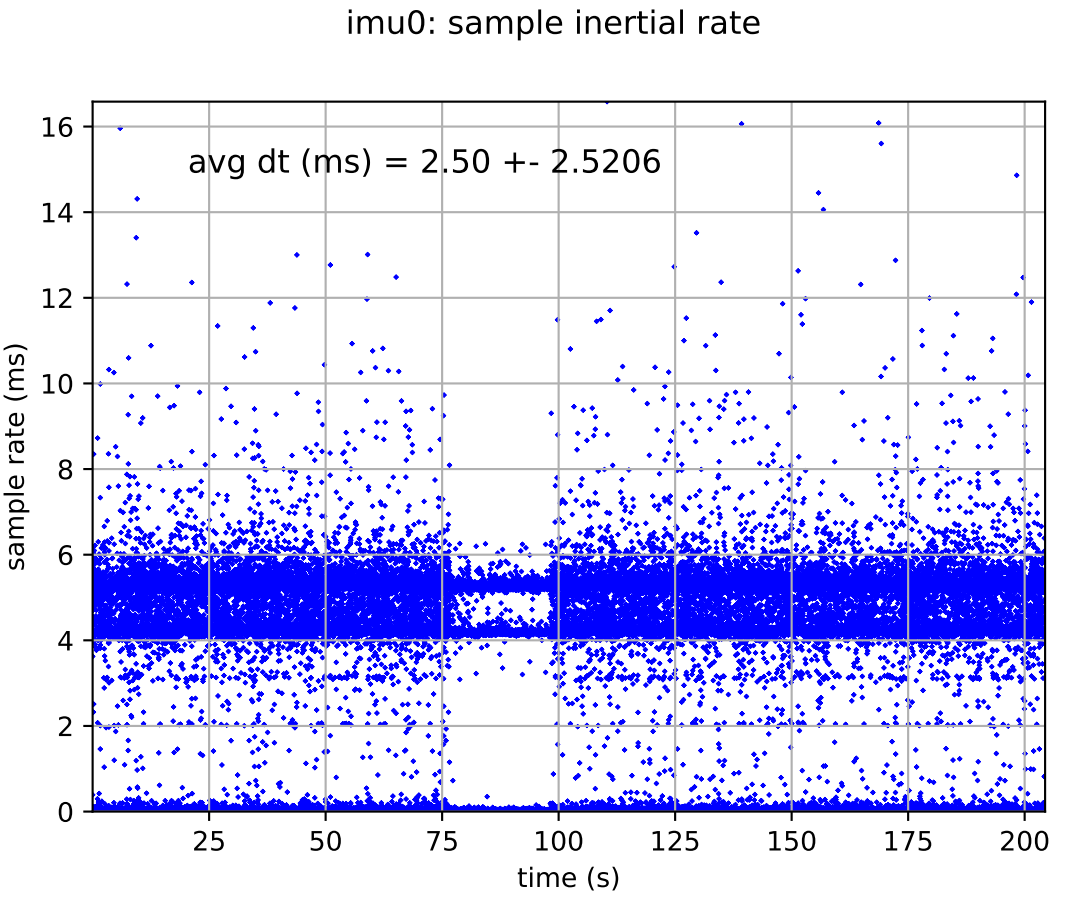
IMU0:

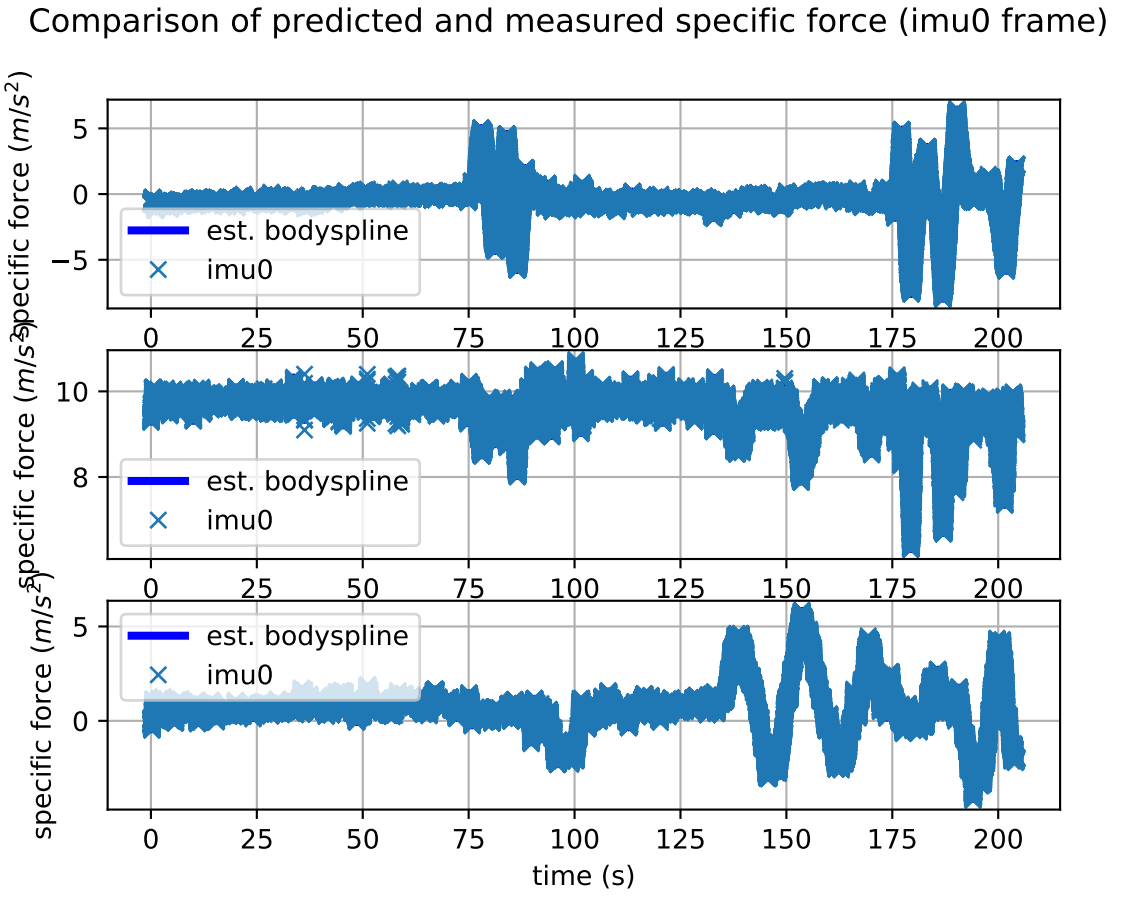
Model: scale-misalignment
Update rate: 400.0
Accelerometer:
Noise density: 0.00445102378
Noise density (discrete): 0.08902047559999998
Random walk: 0.00044197341
Gyroscope:
Noise density: 0.00036083201
Noise density (discrete): 0.0072166402
Random walk: 5.160274e-05

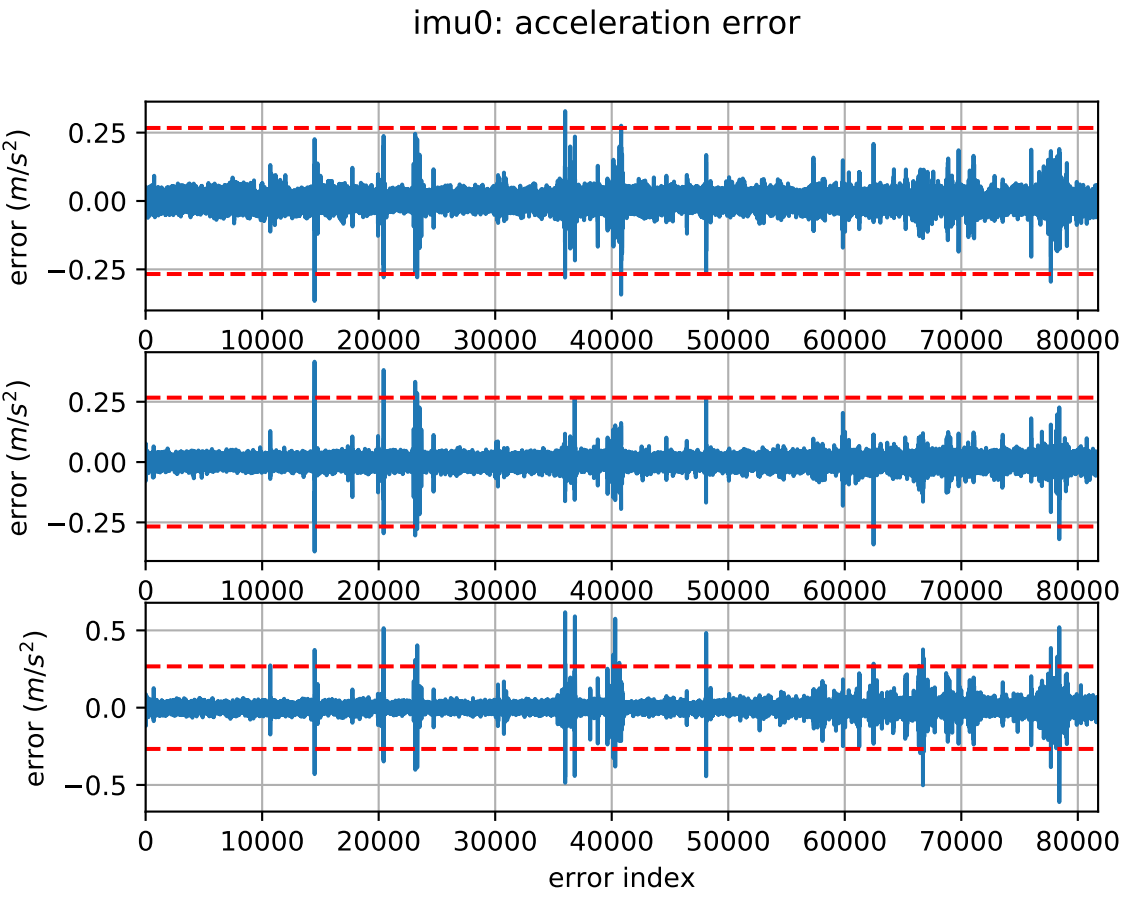
```
T_ib (imu0 to imu0)
[[1. 0. 0. 0.]
[0. 1. 0. 0.]
[0. 0. 1. 0.]
[0. 0. 0. 1.]]
time offset with respect to IMU0: 0.0 [s]
Gyroscope:
M:
[[ 1.00062411  0.          0.        ]
[ 0.00172214  0.99971111  0.        ]
[-0.00414523 -0.00075806  1.00055326]]
A [(rad/s)/(m/s^2)]:
[[-0.00000446  0.00029231  0.00001057]
[-0.00027551  0.00012192 -0.00003977]
[ 0.00004735 -0.00030374 -0.00002992]]
C_gyro_i:
[[ 0.99998649 -0.00079374 -0.00513743]
[ 0.00079302  0.99999968 -0.00014207]
[ 0.00513755  0.00013799  0.99998679]]
Accelerometer:
M:
[[ 1.00030335  0.          0.        ]
[ 0.00091455  1.00048682  0.        ]
[ 0.00491455 -0.00275653  0.99862033]]
```

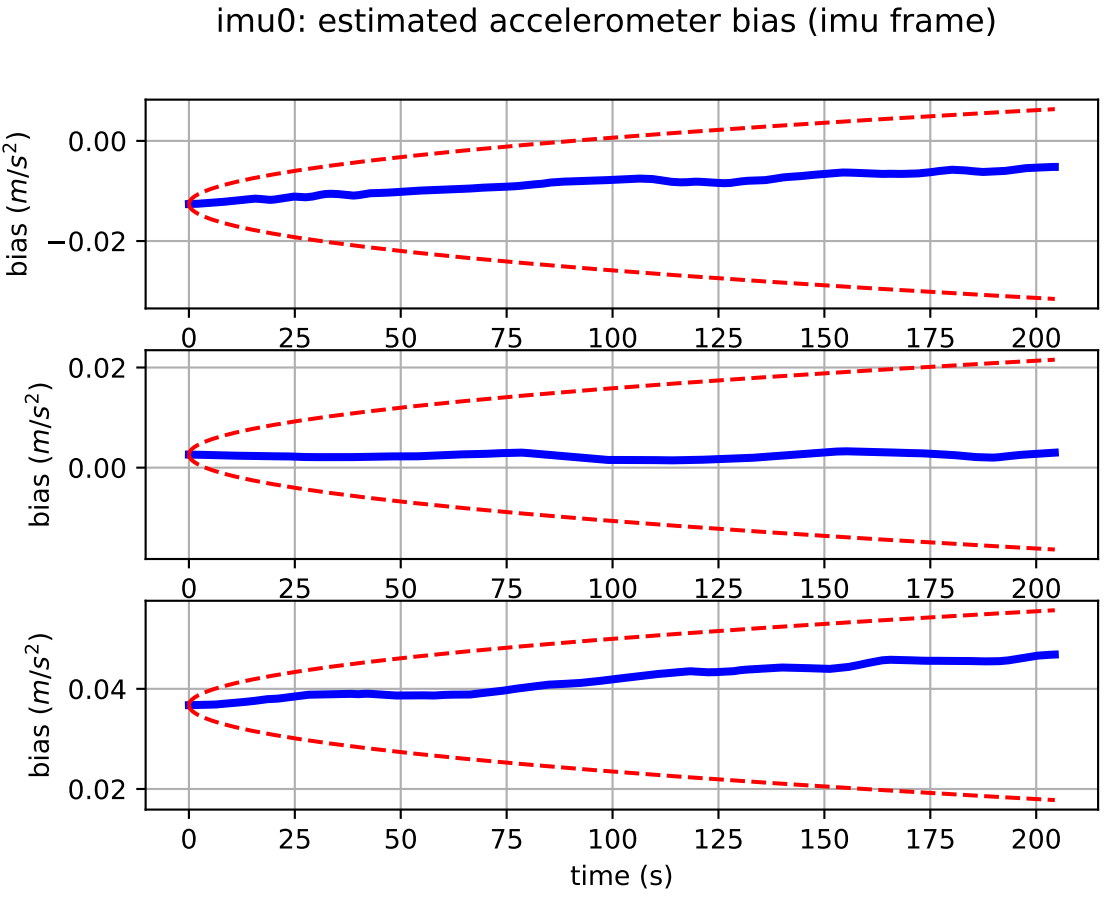
imu0: estimated poses



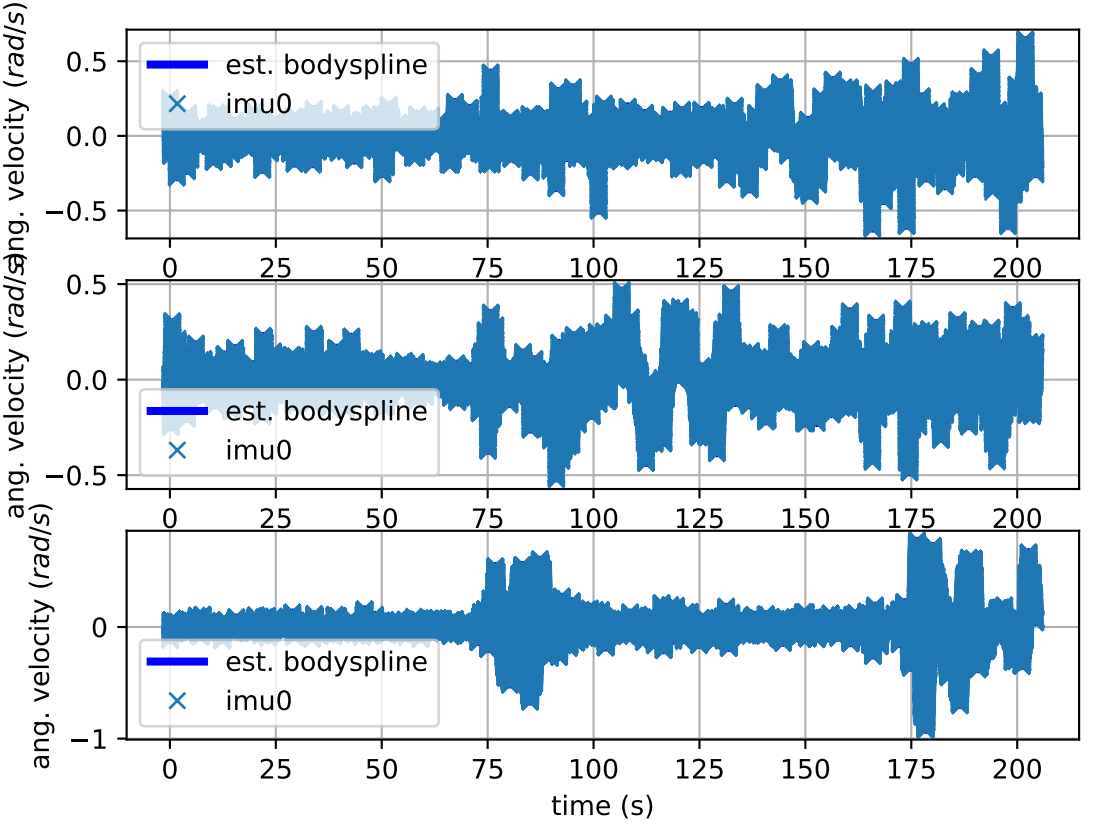

imu0: sample inertial rate
avg dt (ms) = 2.50 +- 2.5206
sample rate (ms)
time (s)
0
2
4
6
8
10
12
14
16
25
50
75
100
125
150
175
200

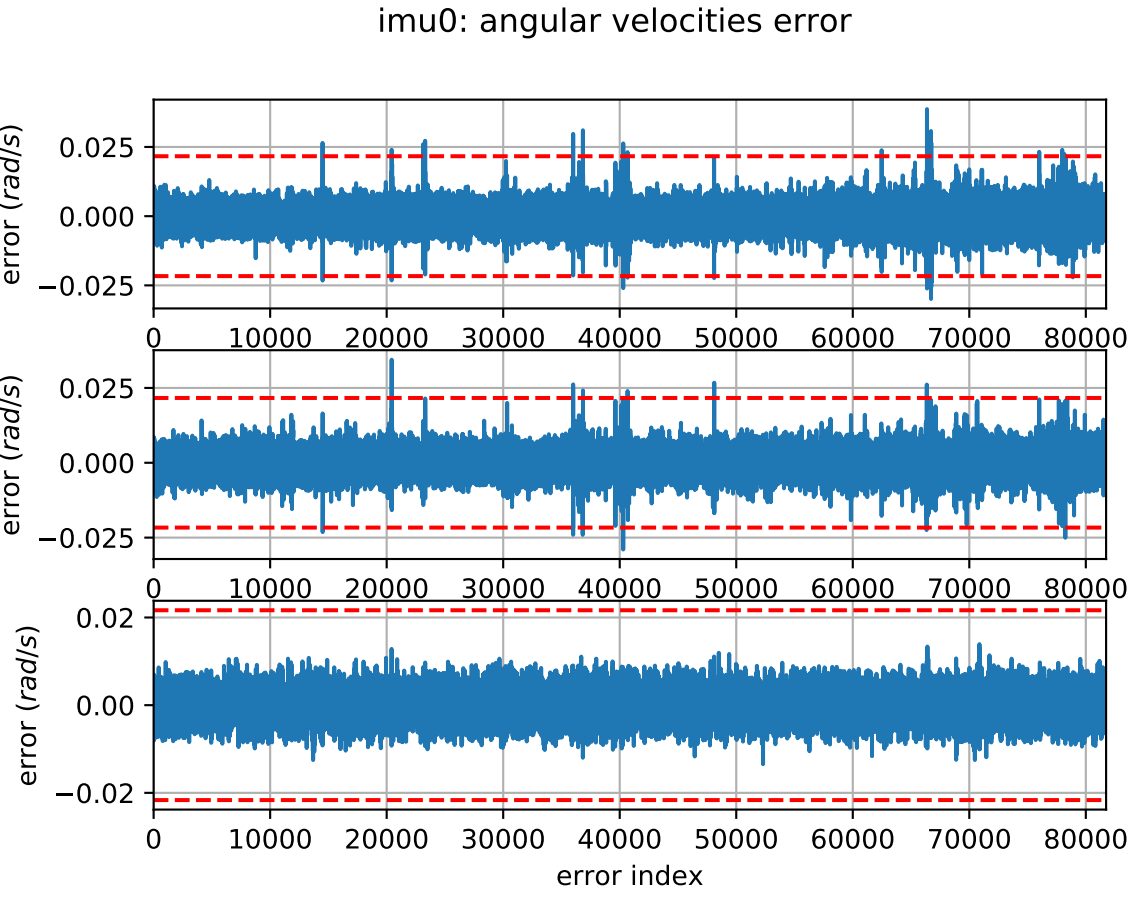

Comparison of predicted and measured specific force (imu0 frame)
specific force (m/s^2)
est. bodyspline
imu0
5
0
−5
10
8
0
25
50
75
100
125
150
175
200
time (s)

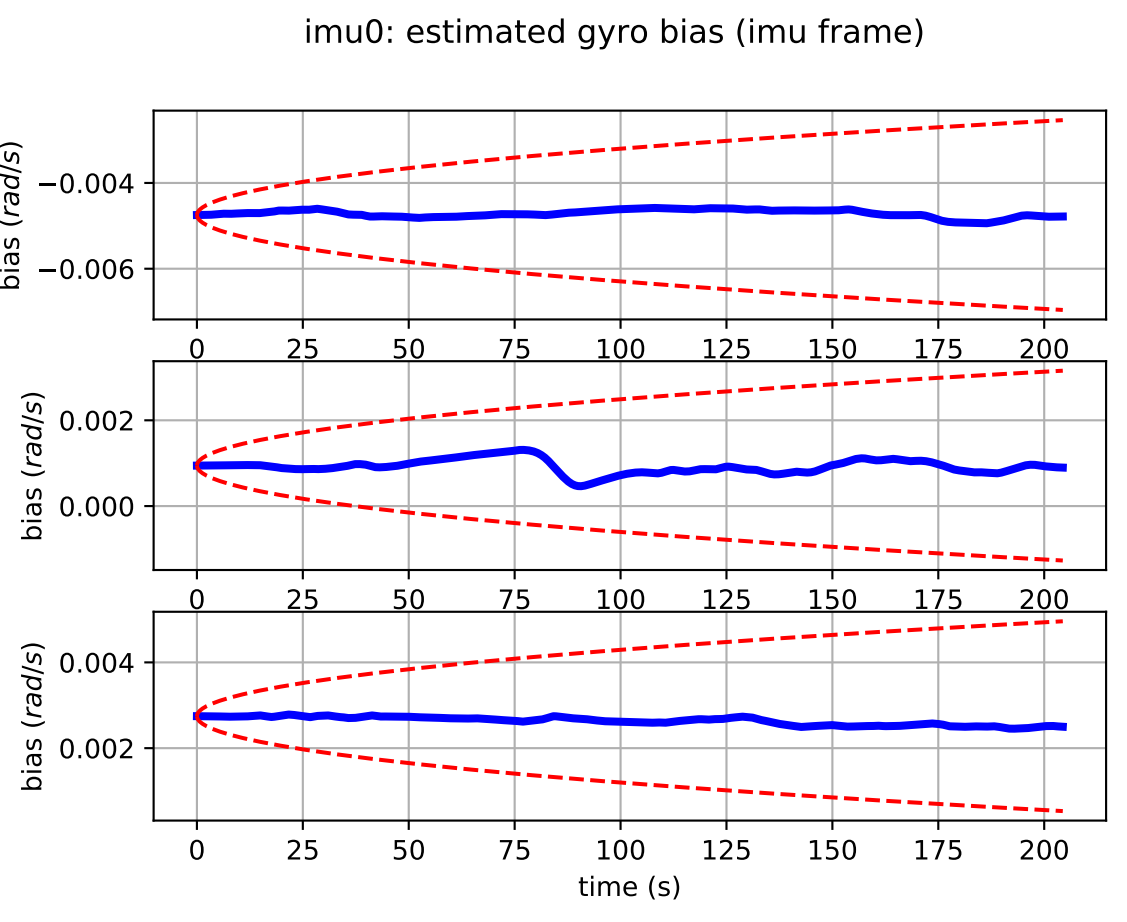

imu0: acceleration error
error (m/s^2)
0.25
0.00
−0.25
0
10000
20000
30000
40000
50000
60000
70000
80000
error (m/s^2)
0.25
0.00
−0.25
0
10000
20000
30000
40000
50000
60000
70000
80000
error (m/s^2)
0.5
0.0
−0.5
0
10000
20000
30000
40000
50000
60000
70000
80000
error index

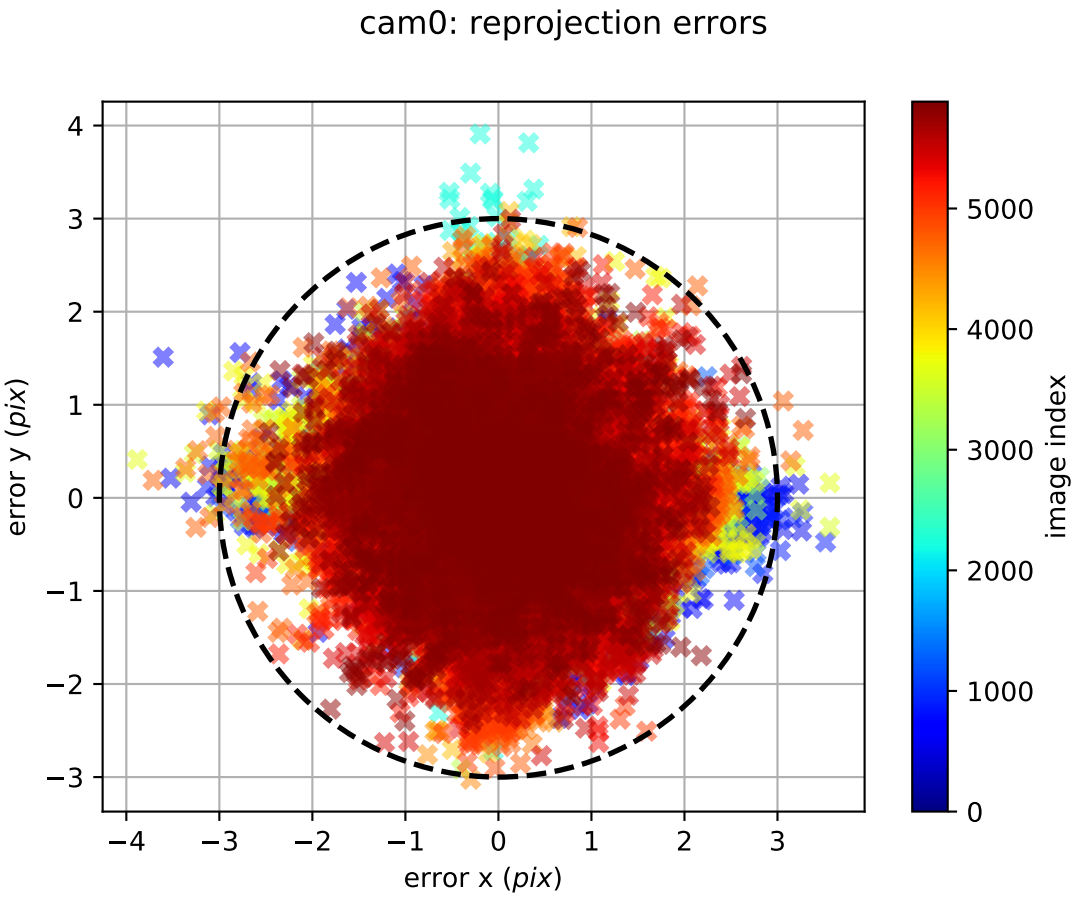

imu0: estimated accelerometer bias (imu frame)
bias (m/s^2)
0.00
−0.02
0
25
50
75
100
125
150
175
200
bias (m/s^2)
0.02
0.00
0
25
50
75
100
125
150
175
200
bias (m/s^2)
0.04
0.02
0
25
50
75
100
125
150
175
200
time (s)

Comparison of predicted and measured angular velocities (body frame)




imu0: angular velocities error
error (rad/s)
0.025
0.000
−0.025
0
10000
20000
30000
40000
50000
60000
70000
80000
error (rad/s)
0.025
0.000
−0.025
0
10000
20000
30000
40000
50000
60000
70000
80000
error (rad/s)
0.02
0.00
−0.02
0
10000
20000
30000
40000
50000
60000
70000
80000
error index


imu0: estimated gyro bias (imu frame)
bias (rad/s)
−0.004
−0.006
0
25
50
75
100
125
150
175
200
bias (rad/s)
0.002
0.000
bias (rad/s)
0.004
0.002
time (s)


cam0: reprojection errors
error y (pix)
error x (pix)
image index
4
3
2
1
0
−1
−2
−3
−4
−3
−2
−1
0
1
2
3
5000
4000
3000
2000
1000
0