Autonomous Vehicle Simulation (AVS) Laboratory, University of Colorado

Basilisk Technical Memorandum

Document ID: Basilisk-rateMsgConverter

MODULE TO CONVERT THE RATE MESSAGE BETWEEN TWO MESSAGE FORMATS

Prepared by	H. Schaub

Status: 1st release
Scope/Contents
This module reads in a message of type `IMUSensorBodyFswMsg`, extracts the rate vector, and returns it in an output message of type `NavAttIntMsg`. The remainder of the output message is zeroed.

Rev	Change Description	By	Date
1.0	First release	H. Schaub	June 30, 2018

Contents

---

1 Model Description

The purpose of this module is to read in the IMU sensor body message from message type `IMUSensorBodyFswMsg`, and store it in the output message of type `NavAttIntMsg`. The body rate vector is stored in the variable `AngVelBody` of the incoming message. The output message of type `NavAttIntMsg` is used as a common attitude input message by the FSW modules. This output message is first zeroed, and then the rate vector is copied into the variable `omega_BN_B`.

2 Module Functions

- **Message Conversion**: The rate info from one message type is copied over to another message

3 Module Assumptions and Limitations

No assumptions are made for this module.

4 Test Description and Success Criteria

The single check has the rate vector of the input message is set to specific values. The rate info of the output vector is then compared to truth model. Further, the MRP and heading vectors should be zero vectors.

5 Test Parameters

The unit test checks the value of the angular rate output and compares it to expected value. It also makes sure that the attitude and sun sun heading sets are returned as zero.

Table 2: Error tolerance for each test.

Output Value Tested	Tolerated Error
`sigma_BN`	1e-12
`omega_BN_B`	1e-12
`vehSunPntBdy`	1e-12

6 Test Results

The following table shows the results of the unit test described above.

Table 3: Test results

Check	Pass/Fail
1	PASSED

The test output are shown in the following tables.

Table 4: Unit test output table for MRPs.

time [s]	Output 1	Error	Output 2	Error	Output 3 $\boldsymbol{\sigma}$	Error
0	0	0	0	0	0	0
0.5	0	0	0	0	0	0
1	0	0	0	0	0	0

Table 5: Unit test output table for rate values.

time [s]	Output 1	Error	Output 2	Error	Output 3 $\boldsymbol{\omega}_{B/N}$	Error
0	-0.1	0	0.2	0	-0.3	0
0.5	-0.1	0	0.2	0	-0.3	0
1	-0.1	0	0.2	0	-0.3	0

Table 6: Unit test output table for sun heading vector.

time [s]	Output 1	Error	Output 2	Error	Output 3 $\boldsymbol{d}$	Error
0	0	0	0	0	0	0
0.5	0	0	0	0	0	0
1	0	0	0	0	0	0