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README - q-Davenport Algorithm

Guidance, Navigation and Controls Subsystem

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es_main_qdp.m

Code Type: MATLAB - Script
Code author: Shashank Singh
Created on: 29/04/2020
Last modified: 08/08/2020
Reviwed by: NOT YET REVIEWED!
Description:
This is the main script, which runs the q-Davenport Algorithm. It also runs the sequential rotation function, in case the q-Davenport fails in the given initial frame.
Formula & References:
Reference: **Chapter 5,** Fundamentals of Spacecraft Attitude Determination and Control Authors: Markley, F. Landis, Crassidis, John L.
Input parameters:
The input arguments to the function are read from the **Input** folder. Here **N** refers to the number of input stars.

1. **es_input.mat** : The contents of which are-
    - **op_bi** : ((N, 4) - Matrix) - The body-frame vectors - (X,Y,Z), of the matched stars
    - **op_ri** : ((N, 4) - Matrix) - The inertial-frame vectors - (X,Y,Z), of the corresponding matched stars
    - **N** : (Integer) - The number of stars matched by Star Matching

Output:
Writes the final estimated quaternion using q-Davenport into **es_q_bi.csv** file in the **Output** folder as well as the **Output** folder(to be used for Sequential Rotation later).

es_qdp.m

Code Type: MATLAB - Function
Code author: Shashank Singh
Created on: 29/04/2020
Last modified: 08/08/2020
Reviwed by: NOT YET REVIEWED!
Description:

This is the main and the only function in the q-Davenport algorithm. This function calculates the **final estimated quaternion**. It also checks if **check_value** is close to zero. If **check_value** is smaller than the threshold value, then $q\_bi = [-1; -1; -1; -1]$ is returned, which indicates the main script that q-Davenport has failed in this frame and then sequential rotation is used.

Formula & References:

Reference: **Chapter 5,** Fundamentals of Spacecraft Attitude Determination and Control Authors: Markley, F. Landis, Crassidis, John L.

Input parameters: Here **N** refers to the number of input stars.

1. **b_m** : ((N, 3) - Matrix) - The body-frame vectors - (X,Y,Z), of the matched stars
2. **m_r** : ((N, 3) - Matrix) - The inertial-frame vectors - (X,Y,Z), of the corresponding matched stars
3. **v**