SPACE EXPLORATION SYMPOSIUM (A3)
Mars Exploration – Part 2 (3B)

Author: Dr. Marco Mammarella
GMV Aerospace & Defence SAU, Spain, mmammarella@gmv.com

Mr. Nuno Paulino
GMV Aerospace & Defence SAU, Spain, npaulino@gmv.com
Mr. Joao Branco
GMV Aerospace & Defence SAU, Portugal, jbranco@gmv.com
Mr. Emanuele Di Sotto
Portugal, edisotto@gmv.com
Mr. Luis Guerreiro
GMV Aerospace & Defence SAU, Portugal, luis.guerreiro@gmv.com
Mr. Pablo Colmenarejo
GMV Aerospace & Defence SAU, Spain, pcolmena@gmv.es

IMPLEMENTATION OF NAVIGATION SYSTEM FOR ENTRY DESCENT AND LANDING MISSIONS

Abstract

Flexible Navigation Filter able to accept and fuse measurements of different type of sensors and frequency is a challenging objective of Navigation System. The paper proposes a Navigation Filter able to accept and/or exclude different type of measurements depending on the actual phase of the mission. The navigation system is based on Kalman techniques and it is applied to Entry, Descent and Landing in Moon and Mars scenarios. The difference of the landing strategies between the two scenarios requires a careful design with customizable function of the filter; these functions, as for example the gravity model, are specific of the application. The filter is able to accept measurements from different type of sensors like accelerometers, absolute and relative vision based position sensors, range measurements from LIDAR and/or altimeter and radiometric measurements for the translational dynamic estimation; measurements from gyroscopes and star tracker are instead accepted for rotational dynamic estimation. The output of the filter includes position, velocity, attitude, attitude rate, IMU bias. Nowadays, the design of the filter has been completed and its use is considered in different ESA activities. In this effort, the design of the filter is treated in details, simulation results are also presented in Mars and Moon Entry, Descent and Landing scenarios.