Comparative Study between Inertial Navigation System and GPS in Flight Management System Application

Authors : Othman Maklouf, Matouk Elamari, M. Rgeai, Fateh Alej

Abstract : In modern avionics the main fundamental component is the flight management system (FMS). An FMS is a specialized computer system that automates a wide variety of in-flight tasks, reducing the workload on the flight crew to the point that modern civilian aircraft no longer carry flight engineers or navigators. The main function of the FMS is in-flight management of the flight plan using various sensors such as Global Positioning System (GPS) and Inertial Navigation System (INS) to determine the aircraft's position and guide the aircraft along the flight plan. GPS which is satellite based navigation system, and INS which generally consists of inertial sensors (accelerometers and gyroscopes). GPS is used to locate positions anywhere on earth, it consists of satellites, control stations, and receivers. GPS receivers take information transmitted from the satellites and uses triangulation to calculate a user's exact location. The basic principle of an INS is based on the integration of accelerations observed by the accelerometers on board the moving platform, the system will accomplish this task through appropriate processing of the data obtained from the specific force and angular velocity measurements. Thus, an appropriately initialized inertial navigation system is capable of continuous determination of vehicle position, velocity and attitude without the use of the external information. The main objective of article is to introduce a comparative study between the two systems under different conditions and scenarios using MATLAB with SIMULINK software.

Keywords : flight management system, GPS, IMU, inertial navigation system
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