Comparison of Loosely Coupled and Tightly Coupled INS/GNSS Architecture for Guided Rocket Navigation System

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Abstract : This paper gives comparison of INS/GNSS architecture namely Loosely Coupled and Tightly Coupled using Hardware in the Loop Simulation in Guided Missile RKX-200 rocket model. INS/GNSS Tightly Coupled architecture requires pseudo-range, pseudo-range rate, and position and velocity of each satellite in constellation from GPS (Global Positioning System) measurement. The Loosely Coupled architecture use estimated position and velocity from GNSS receiver. INS/GNSS architecture also requires angular rate and specific force measurement from IMU (Inertial Measurement Unit). Loosely Coupled arhitecture designed using 15 states Kalman Filter and Tightly Coupled designed using 17 states Kalman Filter. Integration algorithm calculation using ECEF frame. Navigation System implemented Zedboard All Programmable SoC.
Keywords : kalman filter, loosely coupled, navigation system, tightly coupled
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