

عنوان مقاله:

A Novel Sensor Integration Scheme for an Aided Inertial Navigation System Based on a Generalized PID Filter in the Presence of Observation Uncertainty

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خلاصه مقاله:

Implementing a proper integration scheme plays an important role in the performance of integrated navigation systems. Not only does employing a more reliable estimation method improve the accuracy of the integrated navigation system, but this can lead to a more robust solution in the presence of different types of uncertainties. Implementing an integration scheme that has a robust and simple structure is a challenging issue in the design of integrated navigation systems. By inspiring from the concept of PID control, this paper proposes a robust integration scheme for aided inertial navigation systems in the presence of aiding sensor measurement uncertainties. The proposed filter combines the concept of proportional-integral-derivative control theory and the standard Kalman filter estimator to improve the performance of the integration scheme. Thanks to the integral and derivative parts added to the proposed scheme, the integrated system attains a faster and more robust solution in the presence of observation errors and uncertainties. The simulation case studies validate the superior efficacy and capability of the proposed scheme compared to the integration method based on the standard Kalman filter.

کلمات کلیدی:

Integrated Navigation System, Inertial Navigation System, Global Positioning System, Data Fusion, Kalman Filtering

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