Review on Real-Time On-Orbit Estimation Method for Microthruster Thrust Based on High-Precision Orbit Determination

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Abstract—**Review on Real-Time On-Orbit Estimation Method for Microthruster Thrust Based on High-Precision Orbit Determination. Discuss the Strengths and Weaknesses of the methodology to estimate the orbit on-Board during the continuous thrust.**

Index Terms—**Orbit Estimation, Microthruster, Cubature Kalman filter, Orbital Dynamic Model**

I. INTRODUCTION

This document discuss the topic related to satellite orbit determination. In satellite orbit determination mainly contains three phases. First one is data processing, second is predicting measurements and finally orbit estimation and statistical evaluation. Here orbit determination of a satellite experiencing continuous thrust discussed.

II. STRENGTHS OF PAPER [1]

Strengths of Real-Time On-Orbit Estimation Method for Microthruster Thrust Based on High-Precision Orbit Determination as follows :

- Method Cubature Kalman filter is easy to implement on-Board system.
- On-Orbit estimation method estimating the acceleration due to small force
- Estimation algorithm is simple and less computational cost
- Observations Predicting model has High precision
- Accounted thrust force of the microthruster in first order Markov process and satisfy the Langevin differential equation [2].
- Estimation technique algorithm less divergence issues and better stability compare to standard methods like Extended Kalman filter

III. WEAKNESSES OF PAPER [1]

Weaknesses of Real-Time On-Orbit Estimation Method for Microthruster Thrust Based on High-Precision Orbit Determination as follows :

- Method Cubature Kalman filter is particular case of sigma point filter.

- Estimation algorithm not estimating the accelerator meter bias and scale factors.
- Estimation algorithm required ground simulation to finalize the process noise and first order Markov process time parameters and the standard deviation.
- Limitation of estimation algorithm not discussed. It required for Rel-Time On-Board estimation algorithm.
- Simulation are carried out only for circular orbit.
- Accounted thrust force as perturbation equation is first order accurate.

REFERENCES

[1] Qinglin Yang, Weijing Zhou, Hao Chang, "Real-Time On-Orbit Estimation Method for Microthruster Thrust Based on High-Precision Orbit Determination", International Journal of Aerospace Engineering, vol. 2021, Article ID 7733495, 15 pages, 2021. https://doi.org/10.1155/2021/7733495.

[2] H. Li, Determination of Satellite Maneuver Orbit, National Defense Industry Press, 2013.