

عنوان مقاله:

Orbit Determination Using Pattern Recognition of Temperature on a Cubic Satellite

محل انتشار:

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خلاصه مقاله:

The purpose of the present work is orbit determination of a unit cubic satellite using its surface temperatures pattern. This method has recently been developed for space vehicle's attitude estimation and proposed here for position estimation independent of translational dynamics modeling. The approach to this solution is using a pattern recognition algorithm and creating a database for algorithm training. In this solution, no model is used at all, and the satellite is treated as a black box, which is an advantage over the model-based methods and simplifies the whole problem. To this aim, the possibility of work is discussed first, then Thermal Desktop application is utilized to create the database. In following, a pattern recognition algorithm is designed with different transfer functions, and their performances are compared to each other. The best structure selected for the employed algorithm has resulted to an average error of $2:205e - 5$ percentages of the orbit radius in distance, and the average error of $5e - 5$ km/s in velocity. Finally, performance of the algorithm is analyzed in the presence of different measurement noises. This method can be applied to any orbit or even orbit sets. This model-free solution could also be applied in fault tolerant systems, utilized as a backup navigation, and used as a validator for the analytical orbit determination methods.

کلمات کلیدی:

Orbit Estimation, Deep Learning, Neural Networks

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