

17th IAA SYMPOSIUM ON SPACE DEBRIS (A6)
Interactive Presentations - 17th IAA SYMPOSIUM ON SPACE DEBRIS (IP)

Author: Mr. Kexin Zhao

National Astronomical Observatories, Chinese Academy of Sciences, China, zhaokexin17@mails.ucas.edu.cn

A HIGH ACCURACY ORBIT PREDICTION METHOD FOR SPACE DEBRIS BASED ON LATENT
FORCE MODEL

Abstract

This paper presents a new methodology for resident space objects (RSOs) with ambiguous physical model to improve orbit prediction accuracy. Because of the lack of space environment condition information and RSOs' characteristics, it is difficult to make good precision for orbit predictions. On the other hand, purely data driven models present difficulties when the model is forced to extrapolate due to the complexity of the model. Inspired by latent force model (LFM), we propose a method of combining observation data with physical models to improve the accuracy of long-period orbit prediction. We use a sensible, simple assumptions to develop a different, physically-inspired kernel functions. Then, the kernel functions and Gaussian process are combined to predict the orbit of RSO objects with high precision based on a large amount of observation data. The method is verified by the GPS data of on-orbit debris. The results show that the method has certain feasibility and practicability.