中華民國天文學會
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An Investigation in the orbital evolution of the Near-Earth Asteroid Eros

Content

Abstract

In the past research of 433 Eros [1] mentioned that there would probably become the Earth-crossing asteroid within many numerical simulation tests. In this research, we deeply investigated the orbital evolution of 433 Eros. In addition to simulate 433 Eros' orbital evolution, we checked when Eros encounters the Earth, and even hits the Earth. Then, since with long-time simulations the large different results are occurred by the small differences of initial conditions and sets, so we use cloning particles, whose orbital elements with covariance matrix, and observe these evolution. Finally, we need to make a conclusion, determining the most possible results among them, inferring the reasonable process of the evolution. To simulate 433 Eros' orbital evolution, we used two packages, REBOUND and MERCURY. We used MERCURIUS integrator in REBOUND, and the similar method with MERCURY, using Hybrid symplectic integrator for planetary dynamics [2]. We used data in JPL Horizons systems, including the covariance matrix for generating the clones. We probably select the most similar one of the past in our results. So far, we hoped the reasonable reason come out, more discussions in Eros'orbital evolution. Last but not least, we even hoped that we could find out the accurate change in every Eros' orbital elements. Therefore, after simulating Eros' orbital evolution, we believed there would become vary results in the future. In short, we should always keep concentrating on these initial conditions, hoping the slower time to hit the Earth.

Reference

[1] P. Michel+; Nature; 380, 25; 1996
[2] Hanno Rein+; MNRAS; 465, 5490-5497; 2019

Section

Solar System/Exoplanets

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