

Circumplanetary dust dynamics

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Abstract

Space dust particles are grains ranging in size from a few nanometers to millimeters, and they are widely distributed in our Solar System. This talk will focus the dust dynamics around eight major planets, i.e., circumplanetary dust dynamics. Circumplanetary dust particles are subject to a variety of forces, including the gravitational forces from the Sun, the planets and the moons, solar radiation force, Lorentz force, plasma drag, Poynting-Robertson drag, solar wind drag, etc.

First, the dust environments around eight planets are presented. The reasons why some planets do not own the dust rings and why others own are briefly explained, and the relevant research papers are reviewed.

Second, our previous research on circumplanetary dust dynamics is introduced. The dynamics of dust particles originating from the Jovian Galilean satellites was analyzed [1]. The configurations of Martian dust rings were calculated by the direct numerical simulations of particles ejected from Phobos and Deimos [2]. The distribution of dust grains ejected from the lunar surface into the Earth-Moon system was investigated [3].

Space debris and space dust particles share many similarities. The theories and methods used to analyze the dust dynamics could be applied in the field of dynamics of space debris.

Keywords: Circumplanetary dust dynamics, Solar System dust, interplanetary dust dynamics

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