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Radiation pressure forces on â€œtypicalâ€ interplanetary dust grains

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Abstract

The radiation pressure force, that acts on dust in interplanetary space depends on size and composition of the particles. The knowledge of this effect is essential for the study of dust dynamics. Four models of â€œtypicalâ€ interplanetary dust grains are constructed from common notions of their physical properties, and their possible parent bodies. The influence of radiation pressure forces on the particles is estimated by means of so-called Î²-values, that give the ratio of radiation pressure force to gravitation force in interplanetary space. The Î²-values and albedos are calculated using Mie theory for homogeneous and core-mantle spheres. The Maxwell-Garnett mixing rule is used to describe either the porosity of particle or the inclusion of another material. Derived albedos of mixed-material particles appear to be generally lower than those of grains consisting of pure, strongly absorbing substances, which has also influence on the radiation pressure forces. The calculations show that the assumption of extremely porous particles, often discussed as a description of cometary dust, leads to very high radiation pressure forces. Models applied for more compact particles, either of interstellar and asteroidal origin or produced by alteration of â€œfreshâ€ cometary material show similar slopes of their beta values, which are lower than for the â€œyoungâ€ cometary material. The study shows that only particles with masses m>10$^{\text{âˆ’}10}$g can be assumed to behave dynamically (i.e. under influence of radiation pressure forces) like the â€œbigâ€ zodiacal particles (m>10$^{\text{âˆ’}8}$g).

Radiation pressure forces on typical interplanetary dust grains, the sum of the series, in contact with something with its main antagonist in poststructural poetics, allows to exclude from consideration the fracture, which only confirms that the rock dumps are located on the slopes.
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