
 [JJ] Evening Poster | P (Space and Planetary Sciences) | P-PS Planetary Sciences

[P-PS08]Planetary Sciences

convener: Takaya Okamoto (Institute of Space and Astronautical Science, Japan Aerospace Exploration Agency), Kenji Kurosaki (Department of Physics, Nagoya University)

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We call for general interest papers for Planetary Sciences. Planetary Sciences consist of a variety of studies on the past, present, and future of our solar system and exoplanetary systems. Discussions based on various backgrounds are encouraged.

[PPS08-P21]Comparative planetology based on material physics - Formation process of planet indicated by planetary rotation cycle-

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Keywords: Formation of planet, Formation of satellite, Cosmic dust, Planetary rotation cycle

There is no detailed discussion of the rotation period on the celestial body. The rotation cycle of planet except Mercury and Venus, is approximately inversely proportional to the mass of its planet. This is the evidence that planet had captured interstellar substance rotating around the planet in the same orbital area.

A nebula has a center of gravity even in a uniform density. The cosmic dust has the tendency to approach the center of gravity. Most of the substances in the solar system had concentrated in the Sun. But 0.13% of the substances were able to stay by orbiting on the orbitals. The planets were formed those orbiting materials. When the fine particles in the same orbit contact loosely, it will adhere by the interaction of Coulomb force, which is 10^{36} times of the gravitational force. When the cosmic dusts became a celestial body, the gravitational center was changed. The movement of those celestial bodies became eccentric. The eccentric movement of the center celestial body coincides with the orbital period of the orbiting satellite in the early stage of the satellite. So, the satellite group grows on the equatorial plane of the planets. Similarly, the group of planets grows on the equatorial surface of the Sun. In the conventional scenario on the formation of solar system, it was assumed that the entire nebula rotates slowly. But it is inconsistent with the fact that the angular momentum of the Sun possesses only 0.5% of the angular momentum of the entire solar system. Moreover, the conventional scenario cannot explain that there are more than 60 satellites in the disks of Jupiter or Saturn.

At first, orbital motion of satellite and rotation motion of the planet are synchronized. When the satellite loses energy by friction with the dust, it transfers to the orbit of lower energy. So, the gravitational energy of the satellite decreases, but the kinetic energy of the satellite increases. When the orbiting satellite approaches to the center of gravity, the revolution period of the satellite becomes short. The stationary state of the orbital depends on the law of equilibrium (Virial theorem). As the orbiting satellite approaches to the center of gravity, it obtains kinetic energy from the gravitational field. A ring system of Saturn is generated when the asteroid like the comet collapses by approaching to the center of gravity. The gravitational force is too weak to decompose substance. By the equilibrium condition, the strong gravity yields the large kinetic energy state, and exited state of the substance easily decompose by a collision of fine particle. When orbiting satellite was taken into the planet that is the center of gravity, rotation of the planet is accelerated, because the angular momentum of the satellite joins. Assuming the planets were born collecting materials which were orbiting the same orbital region, the composition of the Galileo satellites of Jupiter and the atmospheric constituents of the rock

planets of the solar system can be explained.

The ring of Saturn can be explained by the mechanism that gradually collapses itself by increasing kinetic energy in equilibrium with the increasing gravitational field of the asteroids falling on the Saturn. Even if a satellite decomposes, the broken pieces orbit the same orbit, because the orbital does not depend on the mass from the third law of Kepler. If it is decomposed by the gravitational force, it must move to the center of gravity.

Details are explained at the website [[http://www7b.biglobe.ne.jp/~shinji-k/Eg planetology cover.htm](http://www7b.biglobe.ne.jp/~shinji-k/Eg_planetology_cover.htm)]