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How rings of outer planets formed and why the rotating axis of icy planets tilted

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Abstract

Interstellar matter such as cosmic dust in the rings of outer planets is ionized by solar winds and rotates in synchronization with charged moving particles via magnetic coupling. The rotational speed of the geomagnetic field increases in proportion to the distance from the center of the planet, similar to the rotation of a wheel. The velocity of a wheel-type rotation offsets the rotational velocity (v) based on Kepler-3rd-law (mv2/r=GMm/r2). The formation mechanism of rings due to this offset is confirmed by the relationships between the inner satellites of Jupiter and its rings. In other words, the thickness of Jupiter's three rings coincides with the value calculated using the orbital inclination angles of the corresponding inner satellite. Similarly, the coincidence between the tilt of the narrow ring plane of Uranus, and that of the rotational axis of Uranus, is caused by magnetic coupling. The rotational axis of Uranus, together with its rings, were tilted to 97.8 º. The reason for the tilt can be explained by Uranus's elliptical orbit with 84 years of orbital period and 17.24 hours of rotation period. The Sun heated the same latitudinal region many years, and the geomagnetism of Uranus generated due to the rotational movements of ionized conductive water.

Keywords: Ring, Kepler-3rd-law, Aharonov-Bohm effect, Vector potential, Magnetic coupling, Jupiter, Saturn, Uranus, Neptune

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1. Introduction

There are more than 150 reports on Saturn's rings [1]. Collisions, or close encounters with other planets are reported as the cause of Saturn's ring formation [2]. However, the orbit of a ring is not an ellipse, and the orbit is independent of the mass on the orbiting body according to Kepler-3rd-law (v2/r=GM/r2). Therefore, the theory that is based on collision or gravitational force cannot entirely explain the circle of Saturn's rings. Conventional theories ignore the effects of solar wind, because of effect of geomagnetic field (**B**) of the planet. According to the Aharonov-Bohm effect, an isolated charged particle in motion is affected by the vector potential (**A**) instead of **B** [3]. An isolated moving electron in a circle always changes its direction. A-B effect has claimed that **B** is a mathematical entity for contiguous moving electrons, and **A** physically influences on an isolated electron in motion.

This study proposes a novel explanation for ring formation, based on magnetic coupling of isolated moving charged particle. The rotational speed of isolated charged particle increases in proportion to the distance from the center of the planet via the magnetic coupling. The wheel-type rotational velocity curve offsets the rotational velocity curve of Kepler-3rd-law as shown in Fig.2, 3, 4 and 5. This offset maintains the presence of the rings. The Sun remains in the zenith of the same latitude area of Uranus for more than several years, the temperature of the irradiated area increases. Therefore, a precession movement occurs owing to the bias of the Sun's gravitation. The axis of precession movement always has the component that orients toward the Sun. The orbital plane of Uranus' s rings tilts perpendicular to rotational axis of Uranus by magnetic coupling with rotating ionized water in Uranus.

2. Magnetic coupling among moving charged particles

The proposed model is based on the magnetic coupling between isolated moving charged particles. The static potential V (**E**=grad V) and**A** (**B** = rot **A**) have the same form of distance dependency [4]. These charged moving particles directly affect other charged particles in motion. The quantum theory must deal with the energy between charged motioning particles via **A**. This means that **A** caused by a current**j** provides energy (Em = - **A i**) to another current (**i**). There is horizontal magnetic coupling among high-speed protons (H+) in plasma. However, when in parallel motion, H+ and electrons (e-) are magnetically repulsive. Therefore, the plasma state of solar wind is maintained within the heliosphere.

There is the conventional explanation that solar wind decelerates because of the repulsive force of the geomagnetic field. But the decrease of velocity is explained by collisions to particles in the upper boundary of the atmosphere. Although "hypothetical black matter" has

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been considered to explain the "Flat rotation curve of spiral galaxy [5]", it is generally understood by the horizontal coupling of magnetic effect via physical entity of high-speed charged particles. The solar wind from the rotating Sun spread in the planetary plane perpendicular to the Sun's rotation axis via horizontal coupling of parallel running charged particles. The rotational axes and geomagnetic axes of the outer planets are shown in Fig. 1.

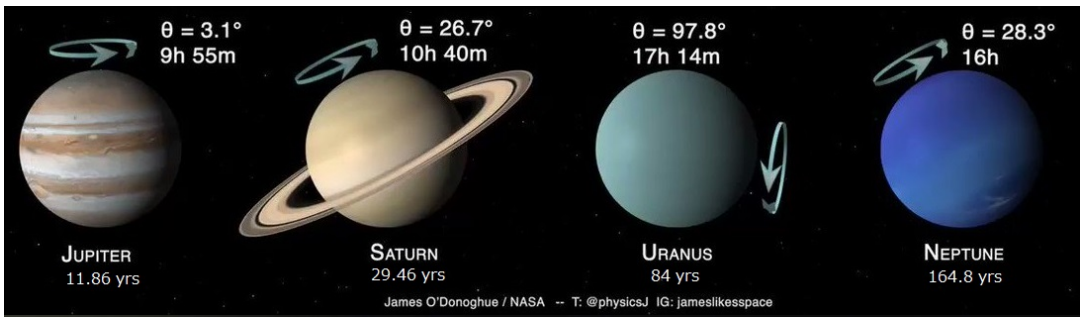

Fig. 1 Rotational axes and geomagnetic axes of the outer planets. This illustration made use of a copy of a part the movie [6]. https://naglly.com/archives/assets_c/2019/01/ezgif-3-62f2665d9075-thumb-480xauto-9169.gif

3. How rings of outer planets are formed

3.1 Rotational speed of geomagnetism

The origin of the geomagnetism in Jupiter and Saturn is due to the rotational movement in the metallic state of hydrogen. Similarly, for Uranus and Neptune, the geomagnetism is due to the rotational movements of ionized conductive water within those icy planets.

The ionized particles in the rings of the icy planets rotate synchronously with the rotating ionized conductive water by magnetic coupling. Each ring exists in the vicinity of the geostationary orbit. We can obtain the values of the geostationary orbit using Eq. 1.

$$(1) \qquad R_0=[G\,M_{planet}\,(T_{orbit}/2\pi)^2]^{1/3}$$

Here, G = 6.67430×10 -11 [N m2 kg2], M planet is the mass of the planet, and T orbit is the rotation period of planet [7]. The results are: R0Jupiter = 16.0×104 km, R0Saturn = 11.2 ×104 km, R0Uranus = 8.27 ×104 km, and R0Neptune = 8.35 ×104 km.

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3.2 Rings of Saturn [1]

Saturn' s rings were formed when the charged materials magnetically coupled around the region of the geostationary orbit, as shown in Fig. 2.

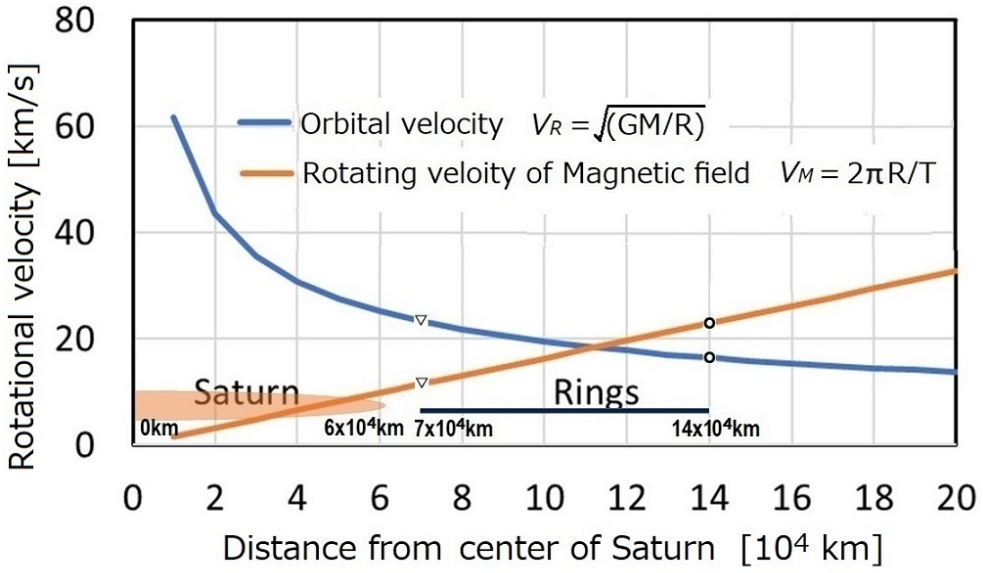

Fig. 2 Rotating velocity curves on Saturn's rings.

3.3 Rings of Jupiter and inner planets [8]

As shown in Fig. 3, three inner satellites of Jupiter exist together with the Main ring, Amalthea gossamer ring, and Thebe gossamer ring. As shown in Table. 1, the thickness of each ring coincides with the value calculated by using the orbital inclination angle of the corresponding inner satellite of Jupiter. This indicates that the inner satellites of Jupiter supply material to the rings.

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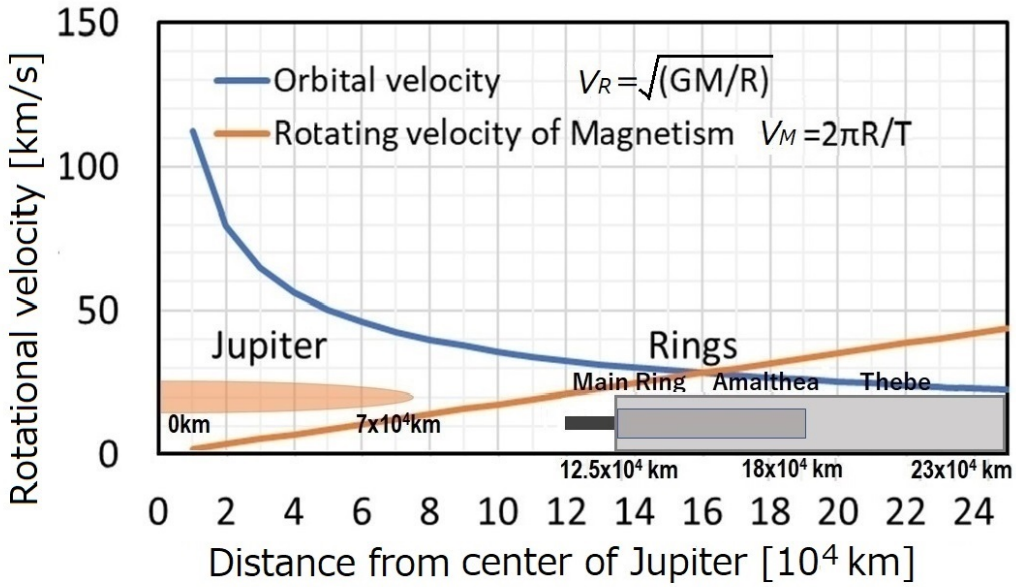

Fig. 3 Rotating velocity curves for rings of Jupiter.

3.4 Rings of Uranus [9]

Figure 4 shows the orbital velocity curve of Uranus and the rotational velocity curve of Uranus's magnetosphere. The solar wind removed the charged particles with the same velocity component as that of the solar wind, from the equatorial plane of Uranus.

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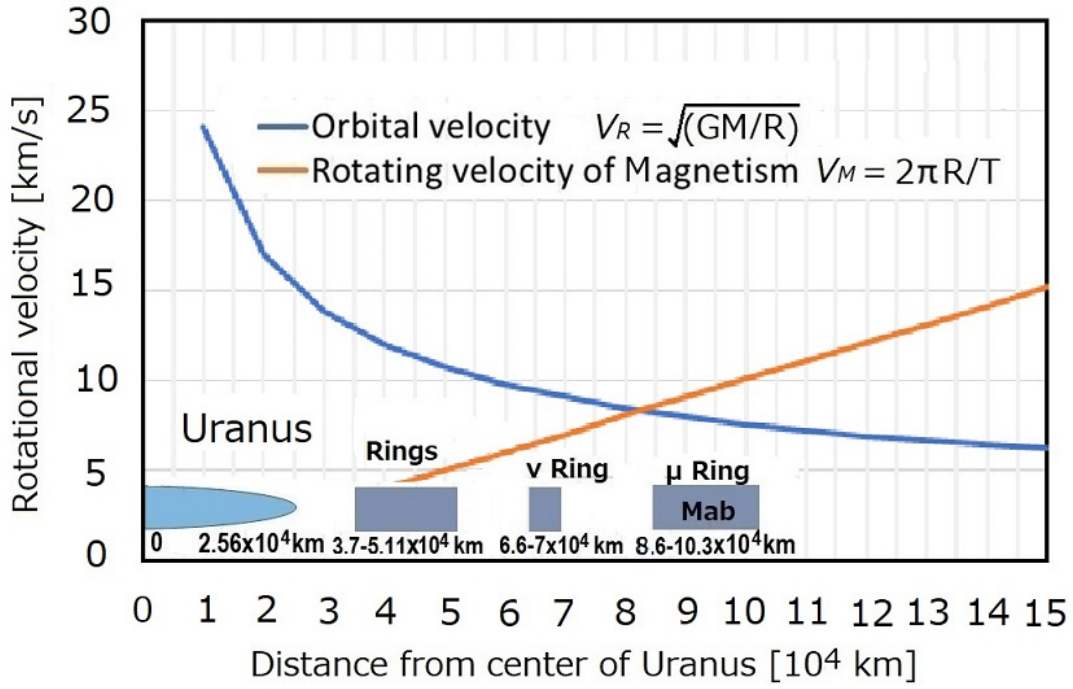

Fig. 4 Rotating velocity curves for Uranus's rings.

3.5 Rings of Neptune [10]

Figure 5 shows that Neptune's ring exists only in a narrow range in the vicinity of Neptune. The inclination of the geomagnetic field crossing the equatorial plane at Neptune, causes the narrow range of Neptune's ring.

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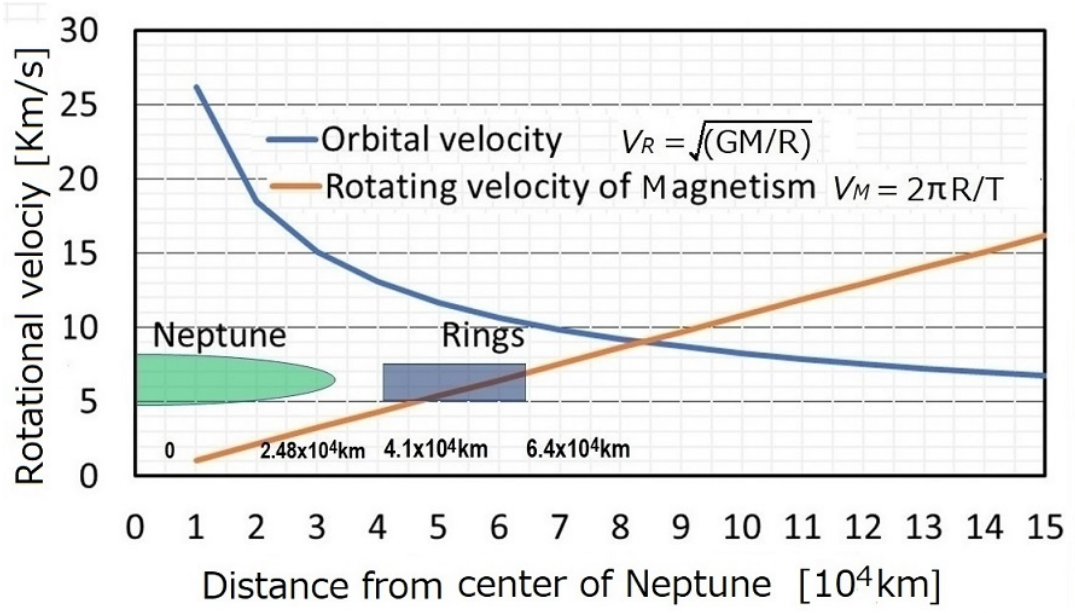

Fig. 5 Rotational velocity curves for Neptune's rings.

4. Why is rotating axis of Uranus tilted at 97.8°

If the Sun remained at the zenith of the same region in Uranus for more than several years, the temperature and density distributions will change. The distribution becomes axially symmetric due to high-speed rotation. Because the movement of ionized conductive water causes the geomagnetism of icy planets, the geomagnetic equatorial plane shifts from the gravitational center of the icy planets. The gravitation of the Sun causes a bias in the gravitational energy of the icy planet, and a precession movement "as seen at movement of a spinning toy" occurs. According to the Virial theorem (i.e., the potential energy and the kinetic energy are equal in an equilibrium state), the direction of a spinning axis shifts to become higher position of the gravitation in case of a high-speed rotation. When Uranus orbits near the Sun side of the elliptical orbit, the effect of the rotation due to the precession movement by the gravitation of the Sun is larger than that of the far side. This effect has been added to the rotation of Uranus for more than a billion years. The tilt of the present rotational axis of Uranus became 97.8°. Furthermore, because the orbit of Neptune is nearly circular, it offsets the orbital variation of precession movement caused by gravitation of the Sun.

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5. Conclusion

The nature of rings was revealed by magnetic coupling via physical entity of isolated moving charged particles. This effect will be important for the future research in plasma physics and space science.

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