

Electromagnetism of the Rings of Saturn: The Role of Levitation Force and “Negative Pressure” for the Superconducting Origin of the Thin Radially Stretched Structure of the Edges of Gaps and Braid Structure of the F Ring

V. V. Tchernyi

General Physics Institute, Russian Academy of Sciences, Russia

Presented in the paper model is a direct continuation of the paper by J. K. Maxwell (1859), he deduced that rings consist of particles. Unfortunately, for his time there was no knowledge about superconductivity (1911) and force of magnetic levitation (1933). Superconductivity of ice and high temperature superconductivity was discovered just in 1986. Importance of the force of magnetic levitation and magnetic “negative pressure” was introduced into space physics for the first time in [1–3] for explanation and mathematical approval of origin of the rings, and organic molecules propagation in between stars. In the disc of rings particles will be located on such a Kepler orbit, where there is a balance of the three acting forces: gravitational, centrifugal and force of levitation. On another hand, particles will be holding on the distance from the planet by the “negative pressure”, which is created by the force of magnetic levitation, and directed from the planet, backward to the force of gravity. At the end of its movement within protoplanetary cloud particles will be allocated within Roche zone. It is also following that the plane of the rings is localizing within magnetic equator of the Saturn which is not exactly coincides with its geographical equator. So, it is necessary to measure this small angle gap by the space probe. The movements of the particles driving by centrifugal force within the rings around the planet will be affected by gravitational and levitation forces. Force of levitation is proportional to the gradient of the magnetic field of the planet. The gradient is stronger on the distance closer to the planet. Radial displacements of the particles within the rings, depend on the balance of gravitational force and force of levitation force. As a result of action of the three forces particles are participating in a helical movements within the rings. Period of the helix is becoming to be bigger with arising distance from the planet. Particles even could move out of the ring, but then the pressure from the bigger magnetic flow in between the rings will push them back to the ring. These displacements are difficult to register within the structure of the ringlets by the space probe, but obviously displacements are well observed at the edges of the gaps, how it is happened with the help of Cassini-Huygens observation of the thin radially stretched structure of the edges for the Encke and Keeler gaps. It is clear that the magnitude of displacements will be bigger on inner edges of the gaps. Far from the planet, near by the ring F , levitation force becomes to have less influence, and period of helical movements is very much extended. As a result, observer see it like a braid or strand structures. On the distance from the planet, behind the ring F , influence of the force of levitation becomes to be negligible, and there is no formation of the rings structure. Certainly, presented picture will be affected by perturbations produced by a satellites on a circular orbits, by fluctuations of the magnetic field of the planet, by plasma phenomena and collisions of the particles, etc.

REFERENCES

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