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Dynamics of Charged Dust Particles in the Inner Jovian Rings

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The ring system of Jupiter is filled with micron-sized dust particles which are subject to electrostatic charging effect because of photoemission and interaction with the corotating thermal plasma. The motion of these small particles and those of sub-micron dimension will be influenced significantly by Lorentz force. An issue of interest is whether the gravitational pull of Jupiter itself can help to siphon the tiny charged particles off the equatorial region and be lost to the planetary atmosphere. Such effect has been found to be important at the Saturnian ring system and might be responsible for the erosion of the D and C rings of Saturn. In this work we will report on our detailed trajectory calculations of charged dust, especially in the innermost region of the Jovian rings by using a realistic magnetic field model plus taking into consideration of Jupiter's shadowing effect in modulating the surface electrostatic potential of the dust grains.