



Force Balance in Saturn's Ring Current

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Measurements of Saturn's magnetic field show a negative perturbation of the theta component in the near equatorial magnetosphere inside of 15 RS, a characteristic signature of a ring current. A sinusoidal perturbation near the planetary rotation period is superimposed on the field depression associated with the ring current, giving evidence of a rotating asymmetric ring current. Using magnetic field and plasma data from the Cassini spacecraft, we demonstrate that the plasma carrying the ring current extends inward to at least 6 RS. We test radial force balance in the symmetric ring current by calculating magnetic pressure gradient, particle pressure gradient, curvature, and inertial forces from in situ measurements. Because the asymmetric ring current is a persistent feature of the inner magnetosphere we test whether it is the remote signature of an asymmetric current system lying beyond $\sim 9RS$, as has been suggested previously, or is, at least partially, locally generated inside of that distance, finding some evidence of local sources. We will report on periodicities of the ion particle pressure and density.