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Particle Pressure Radial Profile in the Dayside Magnetosphere of Saturn: Pressure Gradient, Inertial Force and Ring Current Density During Near-Radial Parts of Cassini

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Passes of minimum Local Time change during Cassini's dayside equatorial plane orbits are selected, and combined energetic particle (MIMI), plasma (CAPS) and magnetic field (MAG) measurements are employed to construct a representative particle pressure radial profile and compute a particle pressure gradient and ring current intensity. Plasma (E<keV) and suprathermal (E>keV) pressures are locally compared to each other and to the magnetic field pressure, providing a more precise in-situ plasma beta. The total particle pressure radial gradient is further compared to the centrifugal body force in order to determine the relative contribution of each term to the total ring current intensity. Initial results indicate that: a) The suprathermal pressure component maximizes in the ring current region near the maximum total pressure (9 to 11 Rs), representing more than 50% of the total particle pressure; b) The in-situ measured radial pressure gradient, and thus the related contribution to the ring current intensity, appears slightly higher than the corresponding centrifugal body force term, within their variation range ($\sim$3$\times$10E-19 N/m vs. $\sim$2$\times$10E-19 N/m), in agreement with the initial results of the statistical approach of the radial force balance in the equatorial plane; c) The azimuthal current components are also computed for the selected passes by fitting the magnetic field data with a modified axisymmetric model of the ring current. Cases of significant pressure gradient features of local or temporal character are also presented and discussed.