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The Variability of the Enceladus Plume as Determined by Cassini Enceladus Flybys

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The major mass loading source in Saturn's magnetosphere, Enceladus, is probed with seven Cassini flybys during 2005 and 2008. The observations have revealed that the primary gas and plasma source originates from an extensive and asymmetric water plume centered at the south polar region. Such a persistent gas production results in a torus filled with plasma and neutrals centered at the Enceladus orbit, and in turn interacts with the plasma newly picked up from the Enceladus plume. The newly added plasma interacts with the corotating plasma to form corotating convection cell as proposed by Gurnett et al [2007] to explain the observed density variation at the orbit of Enceladus. The Cassini magnetometer data is investigated with the help of constraints from RPWS, CAPS, INMS and UVIS observations, as well as 3-D MHD simulations. Our numerical model simulates photoionization, electron impact ionization and charge exchange as the mass loading source into the interaction system. We find the discharge rate of the plume varies by less than a factor of two over the period of the Cassini passes.