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Preliminary results of a test particle model of Saturn's rings ionosphere

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During Cassini's orbit insertion in Saturn's magnetosphere, plasma measurements were performed by the CAPS (Cassini Plasma Spectrometer) in the vicinity of the Saturn's rings. An initial analysis of the data has revealed the presence of an ionosphere close to the A and B rings with O+ and O2+ as major ions, suggesting the existence of an atmosphere made up of molecular oxygen. Oxygen molecules, originating from the radiation-induced decomposition of ice, do not stick on the surface of the ring particles at the relevant temperature and have been suggested to form an atmosphere layer in the vicinity of the rings which could give rise to the observed ions. In this paper, we present preliminary results of a modelling study based on a hybrid model of the ring ionosphere that uses a test particle approach for ions and neutrals and enables to incorporate a fluid of electrons. The model is able to take into account chemical processes such as photo-ionization, charge exchange, as well as plasma processes leading to ion acceleration and heating by means of Monte Carlo techniques. Published plasma data from CAPS are used as a constraint and input to the model.