The effects of the solar radiation pressure on the F-ring particles

R. Sfair (1), **S. M. Guiliatti Winter** (1)

(1) UNESP - Campus Guaratinguetá (rsfair@feg.unesp.br)

The Saturn's F-ring is a narrow ring orbiting outside the main ring system of Saturn. It is located between two close satellites, Prometheus, the interior one, and Pandora. The gravitational interactions between the ring particles and the satellites can be responsible for several structures found in this ring. Showalter et al. (1992) showed that the F-ring material could be divided into two regions: a core composed by centimeter or large particles and a dust envelope composed by μm particles. Recent observations by Cassini instruments brought more complications to this region with the discovery of two new faint rings between the A ring and Prometheus, one of these rings has the satellite Atlas embedded on it. These new rings are tenuous, like the dust envelope which surround the F-ring, and the solar radiation force can play a significant role in this dynamical environment.

In this work we analysed the effects due to the solar radiation forces on the particles of the F ring and the two new discovered rings. In this analysis we also included the perturbation of the satellite Prometheus on the F ring particles and the satellite Atlas on the new rings particles. We have numerically simulated particles with size ranging from 1-500 μm in radius. The density of these particles was assumed to be $1 g/cm^3$. Our results show that a sample of scattered F ring particles can be trapped due to Prometheus effects. However, the particles from the new discovered rings have a short lifetime due to the solar radiation pressure. Only those particles coorbital to Atlas can stay in a confined, although chaotic, orbit. These later results are in agreement with the work by Giuliatti-Winter, Winter and Mourão (2006).