

Panels (P)

Satellite Dynamics: New Developments and Challenges for Earth and Solar System Sciences (PSD.1)

MAPPING LONG-TERM NATURAL ORBITS AROUND TITANIA, A SATELLITE OF URANUS

Silvia Giuliatti Winter, giuliatti.winter@unesp.br

UNESP-Campus de Guaratinguetá, Guaratinguetá, Brazil

Silvia Giuliatti Winter, giuliattiwinter@gmail.com

UNESP – Univ Estadual Paulista, Guaratinguetá, Brazil

Jadilene Xavier, jadilene.rodrigues@unesp.br

UNESP, Guaratinguetá, Brazil

Antonio Prado, antonio.prado@inpe.br

National Institute for Space Research (INPE), Sao Jose Dos Campos, Brazil

André Amarante, andrezinho@msn.com

UNESP-Campus de Guaratinguetá, Guaratinguetá, Brazil

Near polar and circular orbits are of great interest to explore natural satellites, such as Titania, Uranus' largest natural satellite. The reason is the fact that, from a near-polar and circular orbit, the whole surface of the satellite can be observed while the satellite rotates. In this work, we present several maps showing the lifetime of the orbits that can be used by a probe around Titania. The system analysed consists of Titania, as a central body, a probe in its orbit around Titania, and Uranus, as a disturbing body. Regarding the gravity fields involved, we considered the J2 and C22 gravitational coefficients of Titania, as well as Uranus J2 and J4 gravitational coefficients. We built a set of lifetime maps for five different values of the eccentricity of the orbit around Titania. Besides, we also present lifetime maps to compare the effects caused by the presence of the third-body and the gravity coefficients of Titania on the probe's orbit. Our results show that low-altitude almost circular orbits have longer lifetimes. The reason is the equilibrium between the third-body perturbation from Uranus and the J2 and C22 gravitational coefficients of the gravity field of Titania. We also see that the gravity coefficients of Titania affect much more the probe's lifetime compared to the effect due to Uranus' gravity coefficients. The results also show that the values of ϖ and Ω are essential in increasing of the orbits lifetime.