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STABLE LOW-ALTITUDE ORBITS AROUND GANYMEDE CONSIDERING A DISTURBING BODY IN A CIRCULAR ORBIT

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Some missions are being planned to visit Ganymede like the Europa Jupiter System Mission that is a cooperation between NASA and ESA to insert the spacecraft JGO (Jupiter Ganymede Orbiter) into Ganymedes orbit. This comprehension of the dynamics of these orbits around this planetary satellite is essential for the success of this type of mission. Thus, this work aims to perform a search for low-altitude orbits around Ganymede. An emphasis is given in polar orbits and it can be useful in the planning of space missions to be conducted around, with respect to the stability of orbits of artificial satellites. The study considers orbits of artificial satellites around Ganymede under the influence of the third-body (Jupiter's gravitational attraction) and the polygenic perturbations like those due to non-uniform distribution of mass (J_2 and J_3) of the main body. A simplified dynamic model for these perturbations is used. The Lagrange planetary equations are used to describe the orbital motion of the artificial satellite. The equations of motion are developed in closed form to avoid expansions in eccentricity and inclination. The results show the argument of pericenter circulating. However, low-altitude (100 and 150 km) polar orbits are stable. Another orbital elements behaved variating with small amplitudes. Thus, such orbits are convenient to be applied to future space missions to Ganymede. Acknowledgments: FAPESP (processes n° 2011/05671-5, 2012/12539-9 and 2012/21023-6).

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TIDAL, THERMAL AND MAGNETIC EVOLUTION OF TERRESTRIAL EXOPLANETS IN THE HABITABLE ZONE OF DWARF STARS

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The rotation and thermal evolution of a planet plays a main role in the planetary magnetic field evolution. The rotation period determines properties like the regime of the planetary dynamo and its intensity. This is crucial for a planet to keep its reservoir of volatile material like water, protected against the erosive action of the stellar wind and cosmic rays. Planets orbiting dwarf stars are tidally affected by their host, this determines the final rotation period (resonance) or the tidal locking of the planet, especially during the very first Myr. At the same time this first period of the planet history is the most affected by the magnetic activity of the host star. We calculate the rotation and tidal evolution of planets and combine this with a thermal evolution model to know how this very first stages of the planetary evolution finish with an stable and protective planetary magnetic field or with an unprotected planet.

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IMPROVEMENT OF TNO'S EPHEMERIS IN THE CONTEXT OF STELLAR OCCULTATIONS

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Trans-Neptunian Objects are distant, faint and poorly known solar system objects. Stellar occultations are currently, the only way to precisely determine some physical characteristics of these objects, such as the shape/size, the multiplicity or an eventual atmosphere. The prediction of stellar occultations requires both accurate astrometry of stars and accurate ephemeris.

The current methods of prediction use a constant offset compared to JPL ephemeris. The offset is calculated from the most recent observations as the mean difference between observations and the ephemeris. This method assumes that the offset remains constant over a certain period.

In this study, we perform a new ephemeris with available observations and observations done for offset determination. In this context, we have developed a dynamical model of the motion of asteroids