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ABSTRACT ONLY

COORBITAL DYNAMICS: A SEMI-ANALYTICAL APPROACH TO STUDY EQUILIBRIUM POINTS IN RESONANT COORBITAL CONFIGURATIONS UNDER EXTREME INCLINATION AND/OR ECCENTRICITY

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Co-orbital orbital dynamics is really important to understand some aspects of small body populations in our Solar System. The most studied case in the literature are Jupiter Trojans. Not all planets have known coorbitals. For example, Venus, Earth and Mars have confirmed ones but their stability has been a matter of some debate in the literature. There are several co-orbital motion types: tadpoles, horseshoes and quasi satellites. Remember that in the classic planar circular case we only have two tadpoles which librate around $\pm 60°$, these are called Trojans and are located in usually called L4 and L5 equilibrium points. It is important to notice that when the eccentricity or inclination of the secondary body grows those points change their position. This semi-analytical approach can be used to study any resonance such as 1:1 in this case. It provides a numerically integrated Hamiltonian and equilibrium points, as well as resonance widths and periods of librations. The advantage of using this theory is that we do not have restrictions in eccentricity nor inclination except for almost circular orbits where the hypothesis of the model fails. Our objective is to test the model under extreme conditions. Using it, we have mapped the location of equilibrium points for high eccentric and/or inclination orbits and searched for possible known asteroids in the NASA Horizons catalog that match this type of orbits. Furthermore, some problems can be modeled with this work such as pollution in white dwarf spectra. It has been proposed that post main sequence evolved small body population falling into the star due to resonant perturbations in high eccentric orbits could explain this. Also, we can apply this theory to study systems with two co-orbital planets such as the recent evidence for exoplanet system PDS 70 could indicate.