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Stability of the Artificial Equilibrium Points in the Low-Thrust Restricted Three-Body Problem when the Smaller Primary is an Oblate Spheroid

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Abstract: The aim of this paper is to study the existence and stability of the artificial equilibrium points (AEPs) in the low-thrust restricted three-body problem when the smaller primary is an oblate spheroid and the bigger one is a point mass. The AEPs are obtained by cancelling the gravitational and centrifugal forces with continuous low-thrust at a non-equilibrium point. The AEPs are calculated numerically and their movement is shown graphically. The positions of these AEPs will depend on the magnitude and directions of the low-thrust acceleration. Firstly, we have linearized the equations of motion of the spacecraft. The linear stability of the AEPs is studied. We have drawn the stability regions in the $x-y$, $x-z$ and $y-z$-planes and studied the effect of the oblateness parameter $A \in (0,1)$ on the motion of the spacecraft. Further, we have determined the zero velocity curves to study the possible boundary regions of motion of the spacecraft. Finally, we have concluded about the effects of the relevant parameters in this problem.

Keywords: *restricted three-body problem; artificial equilibrium points; low-thrust; stability; oblate spheroid; zero velocity curves.*

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