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A Survey on Space Trajectories in the Model of Three Bodies

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Abstract: This paper presents a survey on space trajectories in the circular restricted three-body problem. In this situation, a spacecraft moves under the gravitational forces of two bodies, which are assumed to be in circular orbits. First of all, there is a search for orbits that can be used to transfer a spacecraft from one body back to the same body or to transfer a spacecraft from one body to the respective Lagrangian points L_4 and L_5. The method employed is to solve the Two-Point Boundary Value Problem. The close approach between the spacecraft and the celestial bodies involved is also studied in the three-dimensional space. Then, the gravitational capture is studied. It is a characteristic of some dynamical systems, like the three- or four-body system, where a hyperbolic orbit around a celestial body can be transformed in an elliptic orbit without the use of any propulsive system.

Keywords: *Astrodynamics; orbital maneuvers; restricted problem; gravitational capture; swing-by; Lagrangian points.*

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