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Orbit transfers between three-dimensional Keplerian orbits

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In the latter half of the 20th century, rockets were developed and overcame the gravity force. Thus, the space exploration era had begun: in 1957, the first human-made object to orbit the Earth, the satellite Sputnik 1, was launched and in 1961 the first human space flight occurred. After that, many other missions took place and others are still currently in progress, such as the famous Hubble Space Telescope, launched in 1990.

However, there is still much work to do regarding space exploration and a fundamental part of that is the application of orbital maneuvers, i.e., the transfer of a spacecraft or satellite between orbits. This is a problem of high complexity and many new strategies of transfers have been developed, involving optimization criteria to minimize the costs and the transfer time.

The goal of this project is to design new strategies of orbit transfers of satellites between three-dimensional two-body Keplerian orbits, starting at any instant or point in the orbit, based on different optimization criteria. Firstly, it will be studied the transfer in the plane of the orbit and then we will proceed to a three-dimensional problem. This will be done controlling the constants of motion of the Kepler problem.

Author: SÁ, Mariana

Presenter: SÁ, Mariana