ABSTRACT

A Study of Trajectory Design From LEO to GEO
Using Izzo's Lambert-Solver

by

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Orbital maneuvering deals with all orbit changes needed to position a satellite from an initial orbit to a selected final orbit. Examples of orbital maneuvering techniques that can be used are Hohmann transfer, Bi-elliptical transfer, and Lambert's problem solver. Unlike the first two techniques, using Lamberts problem for designing orbit transfer, as in this case from LEO to GEO, offers a flexibility for selecting time of flight (tof). Lamberts problem itself basically is a two-point boundary value problem or a determination of an orbit that consists of two positions vector and the time of flight. There are various other methods to solve the problem, and Izzo's solver is one of the available methods and was selected as the main focus of this thesis. In this thesis, the Izzo's solver was implemented numerically using Python language programming and used to study how Δv and tof vary under variation of *initial* orbital elements, such as inclination, right ascension of the ascending node, argument of perigee, and altitude. The results from this thesis can be used as a decision parameter in selecting launching service/site and consideration on how total Δv reduction could save the total launch service that will impact the payload of the satellite.
Keyword: *Orbital maneuvering, Lambert's problem, Izzo's solver, Orbital elements,* Δv