Rascal Delta-V Budget

Saint Louis University

Rascal



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Copper Operational

Test Plan

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# Introduction

## Background

The Rascal Delta-V Budget serves to demonstrate the change in velocity (ΔV) necessary for the performance of the Rascal mission. The data collected in this report was calculated through the use of linear orbit theory, as described in Prussing[1] and elaborated upon in Section 1.2, for four different classes of proximity operations and rendezvous:

1. Separation
2. Course Stationkeeping, or Taxiing
3. Rendezvous
4. Fine Stationkeeping, or Inspection

Separation consists of the mechanisms and maneuvers associated with separating the primary spacecraft (the interceptor) from the secondary spacecraft (the target). This involves the change in relative velocity associated with the initial separation sequence (Essentially an instantaneous change in relative spacecraft velocity from zero to some finite value) and the delta-V required to move the interceptor some distance away from the target.

Taxiing consists of maintaining a set relative distance between the interceptor and the target, and thus, the delta-V per orbit required to do so. This type of maneuver, also known as course stationkeeping, is differentiated from fine stationkeeping due to the difference in the relative displacement it is attempting to maintain (100+ meters, as opposed to 10-).

Rendezvous consists of performing a maneuver that both decreases the relative position between the interceptor and the target to some specified value, while simultaneously reducing the relative velocity between each to zero.

Finally, Inspection involves the maintenance of the final relative displacement between the target and the interceptor at the end of rendezvous.