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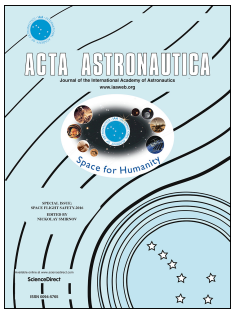

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Tether Cutting Maneuver in Swing-by Trajectory

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Abstract

The swing-by maneuver is known as a method to change the velocity of a spacecraft by using the gravity force of the celestial body. The powered swing-by has been studied to enhance the velocity change during the swing-by maneuver. This paper studies another way of the powered swing-by using tether cutting, which does not require additional propellant consumption, and shows that the proposed powered swing-by can increase the effect of the swing-by as same as using impulsive thrust. Moreover, it is discussed whether the system has possibility to realize both the powered swing-by of a mother satellite and the planetary capture of a subsatellite simultaneously.

Keywords: Tethered-satellite, Tether control, Powered swing-by, Planetary capture

1. Introduction

Swing-by is an acceleration method of spacecraft utilizing the gravity of a celestial body [1]. By utilizing the gravitational force of a celestial body, spacecraft can accelerate/decelerate without requiring fuel, and thus it is an essential technique for deep space exploration. Launched in 1997, Voyager 2 gradually expanded its orbit by performing swing-by maneuvers in stages in the

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