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Author: Mr. Dhrumil Patadia  
National Institute of Technology Hamirpur, India, dhrumil2198@gmail.com

Ms. Tanishqa Jain  
St. Xavier's College, Mumbai, India, khantedtanishqa22@gmail.com

Ms. Mahima Soota  
Amity Institute of Space Science and Technology (AISST), India, mhmsoota@gmail.com

Ms. Vatasta Koul  
Space Generation Advisory Council (SGAC), India, vatastakoul@gmail.com

Mr. Sahith Reddy Madara  
ISAE-Supaero University of Toulouse, France, Sahith-Reddy.MADARA@student.isae-superaero.fr

## A REVIEW ON TRAJECTORY DESIGNS OF POTENTIAL ASTEROID MINING TARGETS

**Abstract**

The near-earth asteroids (NEA) have been a notable literature topic in astrodynamics and orbital mechanics. Several potential NEAs for exploration missions are being considered in this paper based on resources mining opportunities: (i) water extraction - 1996 XB27, 2001 AE2; (ii) Platinum group mining (PGM) - 1998 KY26, Nereus, 1989 ML, 2002 AL31; (iii) Siliceous minerals extraction - 2017 CF32, 2012 HG2. In this paper, we are reviewing the following trajectory methods, for the above-mentioned asteroids, with origins at Earth: [(i) gravity assist planetary swing-by, (ii) Hohmann transfer, (iii) Lambert's problem] while considering the spacecraft's ToF (time of flight), total fuel usage ( $\Delta v$ ), and the final orbital elements. Through a comparison between the trajectory methods of each potential target asteroid that we have listed above, and the corresponding estimate of energy needed for missions, we provide a thorough analysis beneficial for future missions. Further, we are performing relevant simulations/experiments to calculate parameters like  $\Delta v$  and ToF to reach these asteroids (flyby or rendezvous) using gravity assist (G), Solar Electric Propulsion (SEP), and SEP+G trajectory methods. The paper provides a detailed study particularly focusing on the trajectory design methods for asteroid missions.