SPACE EXPLORATION SYMPOSIUM (A3)
Interactive Presentations (IP)

Author: Mr. Toshinori Ikenaga
Japan Aerospace Exploration Agency (JAXA), Japan

Mr. Martin Jocqueviel
Ecole Polytechnique, France
Dr. Yohei Sugimoto
Japan Aerospace Exploration Agency (JAXA), Japan
Dr. Hitoshi Ikeda
Japan Aerospace Exploration Agency (JAXA), Japan
Mr. Alessandro Takeshi Morita Gagliardi
University of Waterloo, Canada
Dr. Makoto Yoshikawa
Japan Aerospace Exploration Agency (JAXA), Japan
Dr. Masayoshi Utashima
Japan Aerospace Exploration Agency (JAXA), Japan
Prof. Nobuaki Ishii
Japan Aerospace Exploration Agency (JAXA), ISAS, Japan

STUDY ON NEO DETECTION AND IMPACT WARNING SYSTEM UTILIZING ARTIFICIAL EQUILIBRIUM POINT

Abstract

Mitigation of hazardous Near Earth Objects (NEOs) has been discussed for the past few decades. The well-known Tunguska event occurred in Russia about 100 years ago, and the Chelyabinsk impact in 2013 reminded mankind that the threats of NEO impacts still exists on Earth. Although such harmful NEO impacts are relatively rare, those impacts have potential to bring severe damage to our society, and for the worst case scenario, destroy our civilization. The first international conference on the NEO hazard mitigation was convened in the United Nations in 1995, and the UN has established two organizations: International Asteroid Warning Network (IAWN) and Space Mission Planning Advisory Group (SMPAG) in 2013. The objective of this study is to propose a space-based NEO detection and impact warning system using an Artificial Equilibrium Point (AEP). In the natural equilibrium points such as Lagrange points, three kinds of forces are balanced i.e., the gravitational forces by the primary and secondary bodies and centrifugal force. The AEP, on the other hand, is literary, "artificial" equilibrium point where the residual acceleration is cancelled by low-thrust. Especially on 1 au circular orbit around the Sun, the AEP can be realized by very small acceleration, which enables to locate the space-telescope at an arbitrary fixed point relative to the Earth. Through some cases of numerical simulation, this paper presents the detectability of the virtual impactors estimated based on the debiased NEO distribution model developed by Bottke et al.