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OPTICAL OBSERVATION OF NEAR EARTH OBJECT BY A MICRO SATELLITE FROM LOW
EARTH ORBIT

Abstract

Near Earth Objects “NEOs” had caused significant damages to local areas such as Tunguska explosion and Chelyabinsk meteorite. NEO with the size range from 10 to a few hundred meters are not almost discovered. However, there is no systematic activity of NEO observation for national safety. In JAXA, our research team is considering the observation network for these NEOs using ground and space-based observation assets. We call our activity “JANESS”, JAXA NEO Survey System. For ground-based observation with 20cm-class small telescopes, we have developed a new technology of highspeed image data processing. We have ground station in Japan and Australia with remote operation, and we have discovered 8 NEOs since March of 2018. Speed of these NEOs were very fast which means they are very close to the Earth. However, the ground-based survey has difficulties to discover the NEO which are very close to the Earth. Therefore, observation from space-based site, for which means satellite in LEO or any other orbit, is considered as an effective way to discover the day-side NEOs since ground-based sites are not able to observe them. We are considering our new technology to apply to the image data processing obtained space crafts. We carried on feasibility study of 100kg class of micro-satellite to observe NEO from low earth orbit and obtained possible satellite system. Also, important technologies are identified such as, attitude stabilization within 1 pixel of CMOS detector for about 20sec during exposure, the cooling technology and thermal control of the CMOS detector to reduce noise, optical design to prevent stray light and a highspeed data transmitter to downlink large amount of image data considering the location and capability of ground station. New technology of image data processing which is applied to ground-based observation is described in another relating paper. This paper presents conceptual design result of the micro satellite and issues about mission equipment, attitude control, thermal control and data downlink. Lastly, in addition to NEOs observation, we are expecting to utilize this satellite to observe geo-synchronous orbit for Space Situation Awareness.