SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
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# DOWN LINK OPTICAL COMMUNICATION EXPERIMENT USING MICRO SATELLTE BODY POINTING AND COLLABORATION WITH CO-LOCATED SCIENCE INSTRUMENT

**Abstract**

A laser communication terminal called VSOTA and a 5m GSD multi-spectral high-resolution cassegrain telescope called HPT will be equipped on a 50kg-class micro satellite called RISESAT. RISESAT has been developed by Tohoku University. VSOTA and HPT have been developed by Japanese National Institute of Information and Communications Technology (NICT) and Hokkido university, respectively as technology demonstration mission. VSOTA downlink experiment is based on the satellite-to-ground and inter-satellite laser communication technologies obtained by Japanese OISETS (Optical Inter-orbit Communications Engineering Test Satellite) mission. VSOTA is a laser signal transmitter without gimbal mechanism and pilot signal tracking mechanism. RISESAT aims to demonstrate satellite-to-ground laser communication by means of accurate attitude control of the satellite body itself. While Tohoku university is completing the engeneering model of Satellite, NICT and Hokkaido University are completing the flight model of VSOTA and HPT and are undertaking its ground tests. The VSOTA on RISESAT was converted to a Space Plug-and-Play Avionics standard. The optical ground stations of NICT are utilized as default and the primary optical ground station is the one located in Koganei, Japan with a diameter of 1.5 m. By sending pilot laser with a visble wavelength and illumination on RISESAT, HPT is designed to be able to

send the coordinate information of the light spot to the attitude control system with a frequency of 10 Hz. RISESAT also carries a sigle retro-reflector which serves the pointing help for ground station. The attitude control system utilized information to achieve more precise attitude control with an error knowledge of down to several arcseconds. Link analysis between VSOTA and ground station in various scinario is calcuratedin which attitude control daynamic condition considered. The alighnment between HPT and VSOTA optical axis as well as Star tracker is undertaken in pre-launch state. We also plan to evaluate alighnment error among them after launch using multiple optical stations on the same filed of transmit beam. In this paper, system design on VSOTA and HPT combination of attitude controlmechanizm will be discussed.