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Design of the SELENE Relay/VRAD Satellite and Mission Instruments for Selenodesy

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Instruments for selenodetic observation in SELENE mission consist of Relay Satellite Transponder (RSAT) and Differential VLBI Radio Sources (VRAD). These instruments will be quipped on Relay Satellite (Rstar) and VLBI Radio Satellite (Vstar), which are small spin satellites of 50-kg class separated from the SELENE main orbiter. Critical design for these hardware has been reviewed and manufacture of these flight model has been started.

Spin stabilization are adopted and there are no orbital and attitude maneuver on Rstar and Vstar to obtain long arc of orbits. Attitude of these satellites will be affected by the separation properties caused from the release mechanism and torques caused by the solar wind pressure and the slope of gravity field. We have newly developed the low-mass release mechanism, and observed its properties by the ground test using gravity canceling equipments and confirmed by the release mission of Micro-Lab Sat in 2002.

Communication for four-way Doppler measurements between Rstar and the main orbiter will be linked using the newly developed S-band omni-type patch antennas. We have confirmed the properties by the thermal environment test, and beam patterns test on Rstar model. Beam patterns have been also measured for S/X-band vertical dipole antenna. These results show that RSAT/VRAD mission on SELENE will derive highly accurate lunar gravity maps including lunar far side.