

Development of highly-functional space-telescope on board micro-satellite

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We have been developing a new highly-functional space-telescope, named the High Precision Telescope (HPT), which will be installed on a 50-kg university satellite, RISING-2. The HPT uses some cutting-edge technologies, namely, a zero thermal expansion pore-free ceramics (ZPF) mirror for the optical system, a liquid crystal tunable filter (LCTF) for the spectrometry, and 4 high-sensitivity charge coupled device (CCD) cameras for the imaging. LCTF makes it possible to select a center wavelength from 650-1000 nm at 1 nm step with 20nm bandwidth. The spatial resolution will 1.5 arcsec which corresponds to 5-10 m on the ground from satellite at altitude of 700 km. The satellite attitude will be controlled in 3-axis with reaction wheels and its stability will be 0.02 deg/sec. The HPT is a highly-functional multi-purpose space telescope that can be widely applicable to visible and near-IR observations both for planets and for the Earth. One of the possible subjects would be a spectral cloud imaging of Venus and Jupiter, which may lead to estimation of cloud top altitudes. Another application would be a high-resolution imagery of thunderclouds in the Earth. Detailed information on a thundercloud structure will enable us to estimate the possible precipitation quantitatively and may help to issue early-warnings of floods caused by torrential rains.