

Nano-JASMINE: A 10-kilogram Satellite For Space Astrometry

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The current status of the nanoJASMINE project is presented. Nano-JASMINE—a very small satellite weighing less than 10 kg – aims to carry out astrometry measurements on nearby bright stars. This satellite adopts the same observation technique used by the HIPPARCOS satellite. In this technique simultaneously measurements of two different fields separated by an angle that is greater than 90 degrees is carried out; these measurements are carried out in the course of continuous scanning observations of the whole sky. This technique enables us to distinguish between the irregularity in the spin velocity and stellar position distribution. The major technical difference between the nano-JASMINE and the HIPPARCOS satellite is the utilization of a CCD sensor device that makes it possible to achieve comparable astrometry accuracy by using an extremely smaller telescope.

We developed a prototype system and evaluated its performance. The telescope is composed entirely of aluminum: A 5-cm telescope including an aluminum beam combiner. The telescope is based on the standard Richey-Chretien optical system and has a composite f ratio of 33 that enables the match of the Airy disk size to three times of the CCD pixel size of 15 μ m. The full depletion CCD will be used in the time delayed and integration (TDI) mode in order to efficiently survey the whole sky in the near-infrared wavelength.

The nano-JASMINE satellite is scheduled for launch in 2008 as a piggyback system. We expected the satellite to measure the position and proper motion of bright stars ($m_z > 7.5$) with an accuracy of less than few mill arc seconds which is comparable to the value that achieved with the HIPPARCOS satellite.