

SMALL SATELLITE MISSIONS SYMPOSIUM (B4)
Small Space Science Missions (2)

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FLIGHT RESULTS FROM PRISMA FORMATION FLYING AND RENDEZVOUS DEMONSTRATION
MISSION

Abstract

The PRISMA project is ready and will be launched by a Dnepr rocket in April 2010. The project is an in-orbit demonstration mission for algorithms and sensor technology for autonomous formation flying and rendezvous, areas essential for future science missions as well as in-orbit inspection and servicing missions. The project consists of two satellites, Mango and Tango. The satellites are launched clamped together and will be separated after initial checkout in space. After this, a series of experiments will demonstrate both various sensors as well as Guidance, Navigation and Control (GNC) algorithms for formation flying and rendezvous manoeuvres. The mission is also a first flight demonstration of two newly developed motor systems developed by SSC, the "HPGP green propellant" thruster system and a microthruster cold gas system. The mission is controlled from a Mission Control Centre at SSC in Solna, Sweden. SSC is responsible for the overall design, development, implementation and testing of the complete system, as well as most of the experiments to be undertaken. Three main partners contribute with important parts: DLR contributes with the navigation system, comprising both the GPS system hardware and the navigation filters for high precision relative navigation. CNES contributes with the FFRF sensor, a novel RF-based navigation instrument for future formation flying, and Danish Technical University (DTU) contributes with a development of a star tracker, to be used as optical rendezvous sensor. DLR and CNES also carries out their own closed loop autonomous GNC experiments with their algorithms embedded in the SSC on-board software. The mission starts with a LEOP and commissioning phase of 14 days, under which most systems will be initialized and characterized. After separation, Tango (which has no thrusters and thus no orbit control) will assume sun/nadir orientation and from this point act as a "target" satellite for the manoeuvre experiments carried out by the Mango satellite. The experiments to be undertaken have an increasing level of complexity, where certain navigation and guidance functions will be validated by initial experiments before other can be conducted. The GNC experiments will be undertaken at relative distances of between several kilometres down to less than one metre. At the time of the IAC conference, the mission has been in space for more than 5 months, and it should be possible to summarize initial results from all experiments as well as sensors and motor systems.