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MASER 11 MICROGRAVITY ROCKET FLIGHT

Abstract

The MASER 11 launch is planned for spring 2008 from Esrange in Northern Sweden. The rocket will carry four ESA financed experiment modules.

The MASER 11 vehicle is propelled by the new VSB-30 rocket motor, a 2-stage solid fuel motor, which gives the 382 kg payload an apogee of 270 km and over 6 minutes of microgravity. Swedish Space Corporation (SSC) and its sub-contractors, DLR, DTM, Lambda-X and Techno System will carry out the MASER 11 mission for ESA.

The payload accommodates the BIOMICS, CDIC-2, XRMON and SOURCE experiment modules, in total four experiments for scientific research, but also the new Maser Service Module (MASM-2) and the new European recovery system.

MASM-2, the new Service Module, has increased performance compared to the previous MASM-1 and features up to 4*5 Mbps CCSDS-protocol telemetry links, 4 μg resolution acceleration measurements, integrated Rate Control System and fibre-optic gyros. The High speed telemetry enables not only high frequency measurements, but also transmission of high-quality video images in real-time to ground. For MASER 11 mission, the MASM-2 and the Digital Video Systems (DVS) are configured to transmit 2*5 Mbps video links via Spacewire interfaces for transmission of real-time images from in total seven cameras in three experiment modules to the users on ground. The recently developed front-end Recovery System ERS has served twice already for other missions, and will now be used for MASER programme for the first time.

The BIOMICS experiment aims at studying the dynamic properties of blood platelets, i.e. their transport and motility in blood vessels, by observing phospholipid vesicles in aqueous solution in a shear flow cell. The 3D-motion of the vesicles will be monitored with a digital holographic microscope.

SOURCE is a benchmark type of experiment on fluid behaviour dedicated to verify numerical predictions. A Freon type liquid behaviour is observed during Marangoni convection, boiling and depressurisation.

CDIC-2 is the continuation of a series fluid science experiments started with the CDIC module flown on MASER 10, creating chemo-hydrodynamic pattern formation at a two-dimensional interface of two liquids, organic and aqueous. The phenomenon is observed by interferometer and shadowgraph.

The XRMON experiment investigates the growth kinetics and stability of Al-based metallic foam under microgravity by on-board X-ray radioscopy.

In this presentation, we will focus on the technical performance of the new Service Module, its application in the MASER program and present an overview of the performance of the new experiment modules.