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FLIGHT INSTRUMENT TESTING FOR THE NEMO-HD SATELLITE

Abstract

NEMO-HD (Nano-satellite for Earth Monitoring and Observation – High Definition) is a spacecraft under development at the Space Flight Laboratory (SFL) at the University of Toronto Institute for Aerospace Studies in collaboration with the Slovenian Centre of Excellence for Space Sciences and Technologies (SPACE-SI). The main objective of the NEMO-HD mission is to provide high resolution (2.8 m GSD) multispectral imaging and HD video capability.

The primary instrument has a single 155 mm aperture with six channels comprising a high resolution panchromatic channel, a high-resolution HD channel, and four multi-spectral channels (420-520 nm, 535-607 nm, 634-686 nm, and 750-960 nm.) The imager is required to have a total MTF of 0.1 at 2.8 m GSD.

Testing of the instrument optical performance consists primarily of two sets of tests; instrument optical testing and system level testing.

Instrument optical level testing is the primary means of testing overall optical performance. This level

tests the optical elements alone without the instrument electronics to verify the optical performance of the lens elements. Interferometric testing of the optical chain results in verifying the resolution of the instrument by measuring the optical MTF. These MTF tests are performed using a HE-NE laser source that will allow measurement of 3 of the channels of the instrument that pass the laser wavelengths.

The second layer of testing consists of system level tests that include the instrument electronics. A collimator is used to project images that enable MTF calculation to be made on all 6 channels of the instrument. This verifies system level MTF which is a combination of the optical MTF and the detector MTF. Combined with expected on-orbit properties such as pointing stability and image smear due to linear motion of the spacecraft this will verify the overall requirement of total MTF of 0.1 at 2.8 m GSD.

Instrument optical level and system level tests are scheduled to be performed in April 2015 and the results and methods will be presented in the paper.