

SPACE PROPULSION SYMPOSIUM (C4)
Interactive Presentations (IP)

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DEVELOPMENT OF A NEXT-GENERATION THRUST BALANCE WITH NANO-NEWTON
RESOLUTION**Abstract**

Formation flying missions such as eLISA require very precise electric propulsion thrusters, which must be calibrated using a thrust balance that can resolve thrusts below the μN range. In this paper, we describe the ongoing development of a novel thrust balance with nanonewton resolution that is capable of carrying a device under test of up to 10 kg. The balance can be used as a thrust measuring device, where the beam of the balance is displaced in horizontal direction. The displacement is measured using a state-of-the-art laser interferometer with a pm resolution and excellent drift stability. The calibration of the balance was done using a voice coil actuator with highly linear force sensitivity. Contrary to other designs, our balance features an on-board electrical control box, which can provide the device under test with high and low voltage without influencing the measurement sensitivity. All collected data is transmitted in real-time via wireless infrared communication. By turning the balance beam 90 degrees, the system can also be used as a conventional gravimetric vacuum balance, which allows an easy and accurate investigation of chemical reactions and processes.