IAF SPACE PROPULSION SYMPOSIUM (C4)
Solid and Hybrid Propulsion (1) (3)

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RAVEN: A STUDENT ROCKET PROGRAM AT LULEÅ UNIVERSITY OF TECHNOLOGY, SWEDEN

Abstract

RAVEN, Rocketry and Aerospace Vehicle Engineering in Norrbotten, is the first rocket project at Luleå University of Technology (LTU), Sweden. The project started in early 2020, and it aims to design, build, test and launch a hybrid propulsion rocket. The initial objectives are to reach an altitude of 10 km with an accompanying payload of 10 kg. The RAVEN team is based at the Kiruna Space Campus and consists of approximately 30 graduate students.

The main goal of the first RAVEN rocket is to demonstrate its technology. The team is designing the entire rocket from scratch, including the hybrid propulsion system that uses nitrous oxide as the oxidising agent and paraffin as the solid fuel component, to produce approximately 5 kN of thrust. A modular rocket structure will offer customisation, enabling simple design changes in future iterations. Thus, the layout allows individual subsystems to be re-designed without changes directly affecting others.

The project is meant to create a foundation for future student and research rocket projects at LTU. The follow-up developments could further iterate on the first rocket design, increasing hands-on education and providing more collaboration opportunities between the university and the aerospace industry – and eventually provide an in-house platform for research and education at the university or even for commercial start-ups. The infrastructure and resources, such as the proximity to the Esrange Space Center launch facility and support from the university and industry, make Northern Sweden an ideal location to establish a continuous rocket program.