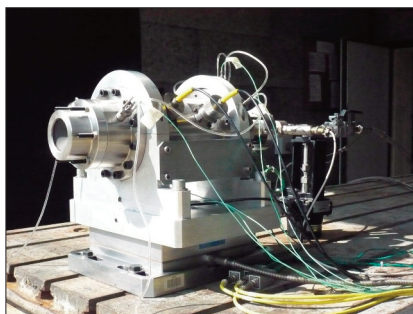


# Space propulsion with green monopropellant



By 2020, Europe plans to prohibit current hydrazine-based fuels for satellite propulsion. To anticipate this development, while optimizing the performance of future orbital missions, CNES and ONERA in 2016 signed an agreement for a "common interest program" (PIC) called SO PMV, involving 4 years of research aimed at removing the technological obstacles prior to developing a "green propulsion" industrial channel. The objective: to develop and qualify, under conditions close to its application environment, a satellite launch demonstrator based on green monopropellant.



Example ONERA research motor for space propulsion

## What is the SO PMV project?

It is a "common interest program" (PIC) aimed at characterizing under experimental conditions the propulsive performance of several prototype clean energy compounds, or "green monopropellants". The research concerns a monopropellant formulation (premixed liquid) based on original ionic liquids and offering optimized physical-chemical properties and unparalleled propulsive performance. This characterization requires the development of a suitable launcher incorporating an innovative, ultra-high-temperature material capable of resisting the harsh conditions induced by the monopropellant combustion.

Also, the intrinsic characteristics of the monopropellants will be determined in order, on the one hand, to guarantee the safety of all the stages linked to the development of this new "green propulsion" channel and, on the other, to acquire vital data for optimizing the dimensions of the launcher.

## What are the applications?

By 2020, the current hydrazine-based fuels for orbital systems are likely to be prohibited by European REACh legislation, on account of their carcinogenic, mutagenic or reprotoxic (CMR) character. The SO PMV common interest program anticipates this prohibition, and would make it possible to provide, by 2022, an alternative technology through the development and validation of a reduced-toxicity, high-performance launcher.

## What are the advantages of this new technology?

- Enhanced satellite performance
- Synthesis through green chemistry
- Reduced toxicity of the propellants

## What know-how does ONERA have to offer?

- Designing the appropriate launcher (demonstrator)
- Testing on different scales (from sample to full-scale system)
- Launcher qualification cycle