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A 75 kN LOX-PARAFFIN HYBRID ROCKET MOTOR FOR NEW-SPACE

Abstract

HyImpulse Technologies GmbH is a German NewSpace startup that is developing a 75 kN hybrid engine for usage in its proposed sounding rocket and orbital launcher. The propellant combination chosen is LOX as oxidizer and a proprietary paraffin-based fuel. The commercially available and low-cost paraffin fuel is enhanced using additives to give the desired mechanical properties and regression rate performance. More than 70 tests of the sub-scale 10 kN technology demonstrator have already been conducted and based on that, the design was scaled up for the 75 kN engine. A new fuel grain production facility has been set up to produce monolithic grains of up-to 3m length and more than 700 kg mass. The engine thrust chamber layout consists of an advanced and proprietary pre-combustion chamber that enables vaporization of the LOX and stable combustion without the need of complex additional heaters. The aft end of the thrust chamber increases the mixing of the propellants to achieve a high combustion efficiency of more than 95