

# The computational characteristics of thrust and propellant mixture ratio regulators for LRE using a propellant combination of methane and oxygen

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## ABSTRACT

A project where the TPUs(Turbo Pump Units) for 10tf-thrust oxygen/methane LRE (Liquid Rocket Engine) are under development is being implemented to include an experimental combustion chamber developed. In the process of it, we introduced the power-balanced engine cycles in order to substantiate concepts of the engine using the combinations of the propellants. Accordingly, the main engine parameters of nominal operating mode are resulted from the 1-D calculations and it is found that the regulators are needed for controlling the expected pressure levels in the characteristics of propellant mixture ratio and thrust supposing the regulator is set to analogue-typed one which is easy to develop.

The technical requirements like the nominal flow rate, its deviations expected and the pressure difference in need helped the several main characteristics of regulators to be determine in this stage.

Here, a dozen of deviation values in the main parameters related to engineoperation are taken into independent consideration and accepted to the results for additional regimes of the regulators.

Finally, we can determine the scheme and the primary dimensions along with the calculation design of the spring acceptablefor general configuration which can definitely forwarded to the autonomous tests of the aggregates. The obtained data in further will be used for successive refinement of operating mode of the engine.

### **Division**

Propulsion and Combustion

### **Keywords**

Oxygen, methane, LRE, Regulator