

## ON A PROPULSION SET-UP FOR ROCKETS

### Technological advantages

#### Innovative :

- Use of metastable polyaza mono-propellant.
- Propellant tank pressurization ensured from the exhaust gases.
- No need for auxiliary tanks.

#### Efficient :

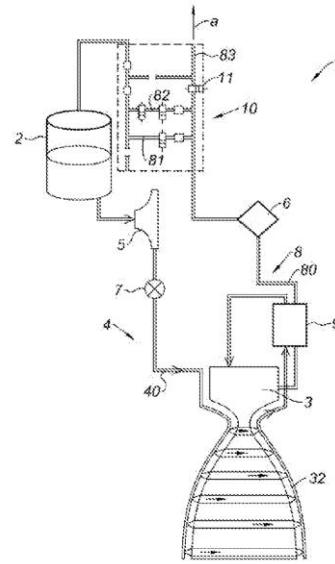
- Safe operations : use of inert and cooled down pressurization gases.
- Simplified architecture, weight reduction.

### Invention synthesis

The invention deals with an efficient propulsive system adapted to rocket engines.

Traditional systems use all the exhaust gases to produce thrust. To maintain the propellant tank under pressure, it is required to use auxiliary pressurized gas tanks or to use cooling fluid tanks.

The invention simplifies the architecture and reduces the weight by partially reusing the exhaust gases from the combustion chamber to pressurize the propellant tank and to obtain a constant flow rate. The use of polyaza mono-propellant generates inert gases (nitrogen). A heat exchanger cools down the reused exhaust gases to acceptable temperatures before injection into the propellant tank. A turbine in the reused exhaust gas line powers the turbopumps in the propellant feeding line.



Schematic illustration for a Tap-off engine

- (1) Propulsive set
- (2) Propellant tank
- (3) Combustion chamber
- (4) Feeding lines
- (5) Propellant tank turbopump
- (6) Turbine in the exhaust gases line
- (7) Propellant flowrate control valve
- (8) Exhaust gas line from the combustion outlet
- (9) Heat exchanger
- (10) Gaz expansion unit
- (11) Pressure control valve

### Commercial benefits

- Simple system, less costly than traditional set-ups and lighter. Improvements in power / mass ratio.
- Safe operations (inert cooled down gas).

### Potential applications

- Propulsion systems using propellants generating neutral gases.

Patented invention - under license.

For more information :

[Valo-TT@cnes.fr](mailto:Valo-TT@cnes.fr)