

SPACE PROPULSION SYMPOSIUM (C4)  
Electric Propulsion (4)

Author: Mr. Luca Paita  
Sitael Spa, Italy, l.paita@alta-space.com

Mr. Ugo Cesari  
Sitael Spa, Italy, u.cesari@alta-space.com

Mr. Francesco Nania  
Sitael Spa, Italy, f.nania@alta-space.com

Dr. Nicola Giusti  
Sitael Spa, Italy, n.giusti@alta-space.com

Mr. Leonardo Priami  
Sitael Spa, Italy, l.priami@alta-space.com

Prof. Mariano Andrenucci  
Sitael Spa, Italy, m.andrenucci@alta-space.com

A 500 MICRONEWTON CLASS FEEP THRUSTER

**Abstract**

The FEEP thruster is known to have unique performance in the space thruster panorama. Some of the main advantages of this technology are

- high specific impulse, which ranges between 5000 and 9000 s;
- very low thrust noise,  $\leq 0.1$  N/Square(Hz) which is below the nano-balance detection threshold;
- very short response time, 50-150 ms depending on the thrust step and initial thrust level;
- a thrust resolution below 100 nN;
- low nominal power, about 6 W @ 100 N of thrust;
- high thrust accuracy.

Alta has developed a 150 N Class FEEP thruster (FT-150 FEEP Thruster) within the framework of the ESA LISA Pathfinder programme. During the development phase, a characterization of thrust performance with respect to the geometric parameters of the emitter was carried out. This allowed a set of parameters of the emitter design to be identified, that can be changed to achieve different thrust levels. Therefore a 500 N Class FEEP thruster (FT-500 FEEP Thruster) was designed and tested at emitter level. The emitter showed a very stable emission in the thrust range of 100-600 N and was capable to reach a minimum and maximum thrust level of 2 and 750 N, respectively, without losing the main advantages of this technology in terms of time response and high specific impulse. This article provides the configuration and the results of the characterization tests at emitter level and a dedicated thruster design.