

IAF SPACE PROPULSION SYMPOSIUM (C4)
Electric Propulsion (1) (5)

Author: Dr. Bernhard Seifert
FOTEC Forschungs- und Technologietransfer GmbH, Austria

Mrs. Nina Sarah Mühlich
FOTEC Forschungs- und Technologietransfer GmbH, Austria

Mr. Joachim Gerger
FOTEC Forschungs- und Technologietransfer GmbH, Austria

Prof. Friedrich Aumayr
TU Wien, Austria

Mrs. Alexandra Bulit
ESTEC-European Space Agency Technology and Research Centre, The Netherlands

Dr. David Krejci
ENPULSION, Austria

LIFETIME TEST OF CLUSTERED IFM NANO THRUSTER WITH ELECTROSTATIC FOCUS
MODULE**Abstract**

A focussing electrostatic lens system reduces the beam divergence as well as a potential thrust vector misalignment. For one, this improves the thruster performance, including specific impulse, thrust and thrust vector stability. Furthermore, it relaxes the constraints on the placement of spacecraft structures in the vicinity of the thruster so that the available space may be used more effectively. A focus module, which is distinguished by its compact design and modularity was developed using a verified COMSOL Multiphysics ion trajectory simulation model. For scientific missions, like ESA's Next Generation Gravity Mission (NGGM), the highest thrust vector pointing accuracy and stability is required for the Attitude Determination and Control System (ADCS). These requirements can be fulfilled by using an IFM Nano Thruster combined with the developed focus module. Furthermore, the modularity of both can be used to generate a higher total thrust through clustering. With the focus module the number of clustered thrusters can be reduced due to the thrust optimisation of the focus module by 30. For the first time, several IFM Nano Thrusters with attached focus modules are being tested in a clustered configuration. The experimental performance results will be presented, including thrust and specific impulse. Furthermore, beam properties will be analysed for different thruster operation points. A lifetime test of more than 300 hours will be performed to verify the durability of the newly developed focus module. The results will demonstrate the qualification of the IFM Nano Thruster for scientific missions like NGGM.