Paper ID: 80100
student

IAF SPACE PROPULSION SYMPOSIUM (C4)
Disruptive Propulsion Concepts for Enabling New Missions (9)

Author: Mr. Bintang Alam Semesta Wisran AM
Skolkovo Institute of Science and Technology, Indonesia, BintangAlamSemesta.WisranAm@skoltech.ru

# ENHANCEMENT OF LUNAR THRUSTER NOZZLE'S SHAPE FOR SAFETY AND PRECISION LANDING ON LUNAR SURFACE

**Abstract**

For any powered lander on the surface, lunar dust is a major problem, since the lunar landing vehicles may be damaged by dust and rocks. The underlying problem is the implementation of engineered particles that are injected into the missile plume preventing the spacecraft to safely land on the lunar landing pad. There needs to be an effective modification to the descent phase on the lunar surface to counter this problem.

To overcome this challenge, the main focus is to characterize the optimal trajectory of fluid flow derived from the improvement of the lunar thruster nozzle's shape in order to mitigate the induced effect of lunar dust as well as to comprehend the hidden physical phenomenon behind the lunar dust impact.

Using propulsion-based open source software like OpenFOAM, we will model how the particles of plumes interchangeably absorb and dissipate heat within the engine and during descending phase, including material adhesion of the regolith, to optimize impact velocity and material selection.

In addition to numerical-based physical modeling, in this paper we will also be briefly discussing the safety and precision landing of the spacecraft on the lunar surface.