

# Validation and Verification of Aerospike Designs in Supersonic Flow

Ishar Singh Saini<sup>1</sup>

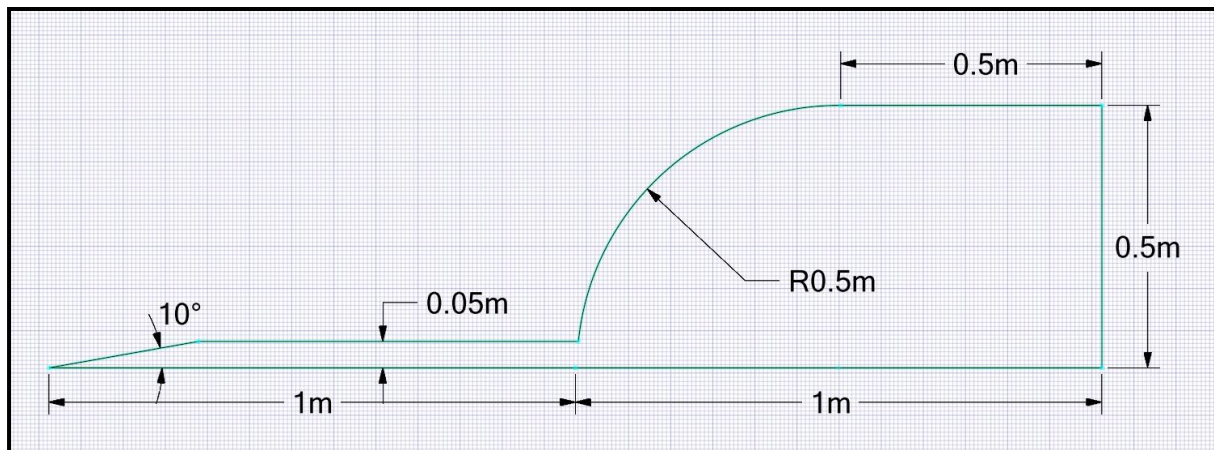
<sup>1</sup>Department of Aerospace Engineering, Amity University Mumbai, Panvel, Maharashtra

Mentor: Dr. Tushar Chourushi<sup>2</sup>

<sup>2</sup>Assistant Professor in Aerospace Engineering, Amity University Mumbai, Panvel, Maharashtra

## ABSTRACT

This project aims to simulate the supersonic/hypersonic flow over an aerospike blunt body using the SonicFoam solver which is part of the open-source software OpenFOAM and verify the obtained aerodynamic forces with the available results. The use of a blunt shape considerably reduces aero heating over the missiles and blunt shaped bodies but leads to increased drag. To avoid this, an aerospike becomes very useful to create a detached shock ahead of the body, reducing the aerodynamic drag of blunt bodies at supersonic or hypersonic speeds. Thus, modifying high-speed flight vehicles by adding a spike attached to the stagnation point drastically increases efficiency. The length of the aerospike is set equivalent to the base diameter of the cylinder (body). Numerical simulations are performed by keeping a constant Reynolds Number at  $0.23 \times 10^6$  and varying the Mach numbers.



**Figure 1. Details of Blunt Body with Aerospike Geometry**

### Reference Paper:

David H. Crawford's research paper – 'Investigation of the flow over a spiked-nose hemispherical cylinder', 1959.