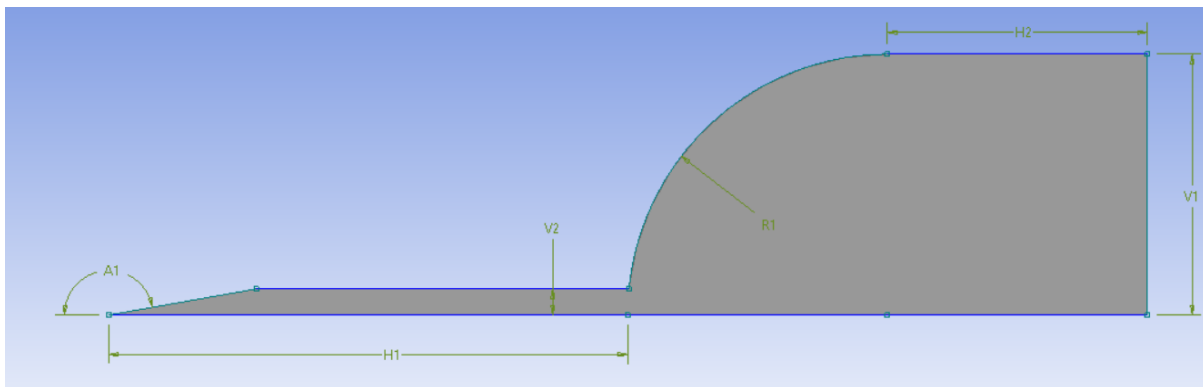


Verification and Validation of aerospike designs in supersonic flow

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Abstract

This project aims to simulate the supersonic flow over an aerospike blunt body using the OpenFOAM solver and verify the obtained aerodynamic forces with the available results. The use of a blunt shape considerably reduces aero heating over the missiles 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). The following geometric parameters are used for the aerospike blunt body shape.



NAME	VALUE
V1	19.2 mm
H1	38.4 mm
R1	19.2 mm
V2	1.92 mm
H2	19.2 mm
A1	170°

Numerical simulations are performed by keeping Reynolds Number at 5.71×10^6 and varying Mach numbers.

References:

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