

High – Speed Compressible Flow over Blunt and Re-entry Bodies and Validation of Experimental Results

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ABSTRACT

This project aims to simulate the supersonic/hypersonic flow over some blunt bodies 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 which is quite useful when during a re-entry from space. The experimental results for bow-shocks of Kim, Chul-Soo [1] for a cylindrical body were validated in this study. Post validation, re-entry geometries which were taken from cases run by R.C. Mehta [2] [4] [5] are introduced in the flow and the aerodynamic parameters were calculated. Standard atmospheric values are used for air at sea level and varying the Mach numbers.

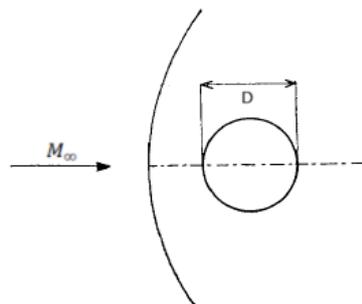


Figure 1. A Brief of Flow Domain over the Cylindrical body

REFERENCES

1. Kim¹, Chul-Soo² " Experimental Studies of Supersonic Flow past a Circular Cylinder". In: *Journal of the Physical Society of Japan Vol. 11, No. 4*, 1956
2. R.C.Mehta¹ "Numerical Computation of Heat Transfer on Reentry Capsules at Mach 5". In: *43rd AIAA Aerospace Sciences Meeting and Exhibit*, 2005