ABSTRACT

A Computational Fluid Dynamic (CFD) Model and Analysis of a Bullet with Magnus Effect

by

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A computational study of 5.7 mm caliber bullet at was carried out using OpenFOAM version 8.0. In this study, the Reynolds number Re and Mach number M were assumed constant, that is, $Re = 1.2 \times 10^5$ and 0.88, respectively. A rotational moment with magnitude $\sim$ 3000 rpm was defined to represent the Magnus moment during bullet's dynamics. Dynamic mesh combined with snappyHexMesh dictionaries were used in this simulation. The computational domain consists of $\sim$ 250 000 hexahedral meshes. The Cyclic Arbitrary Mesh Interface (AMI) boundary condition was defined as the interface between the rotational and stationary regions inside. A steady-state and compressible flow were solved using *rhoPimpleFOAM* solver with $k - \epsilon$ model to simulate the transient region in this flow. The results shows that at $\alpha = 2$ deg, the C_d and C_l are 0.22 and 0.062, respectively.

Keyword: *Magnus effect, bullet, CFD, dynamic mesh*