CASE STUDY : MISSILE SEPARATION

INTRODUCTION

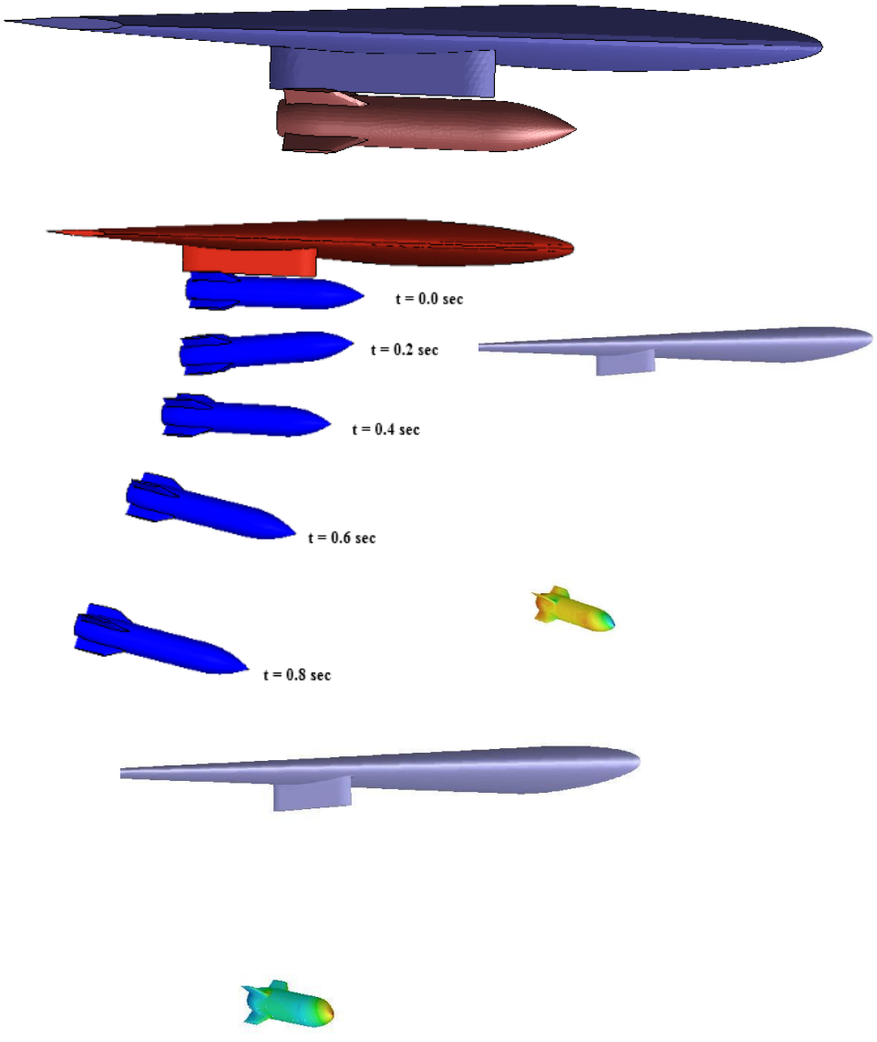
Missile which are operational or newly designed are required to be tested for safe separation from the air vehicle. It is acted upon by gravitational and aerodynamic forces which affect its motion and trajectory while separating from air vehicle. To observe this motion and trajectory, laboratory experimental methods like wind tunnel tests can be performed; however they are costly, time consuming and involves high amount of accidental risks. CFD simulation of missile separation overcomes all these disadvantages and predicts results close to experimental observations.

CHALLENGES

- Defining motion properties using "User Defined Function"(UDF).
- Using 6 DOF conditions for predicting motion, forces and trajectory of missile separation.
- Controlling Mesh deformation by appropriate settings.

THE SOLUTION

The trajectory and motion, which the missile follows due to gravity and aerodynamic forces acting on it upon separation from the air vehicle, can be precisely predicted using numerical methods. Six-DOF approach is adopted to account for effect of various forces and moments generated during separation of missile from air vehicle. The forces and moments can be easily computed at different time steps. As the missile moves, mesh deformation method is used to update the new position of missile. From the CFD simulation, "Pressure Coefficient" (Cp) can be predicted over the length of the missile at different time steps, which helps us to validate experimental observations obtained from Wind tunnel test.



BENEFITS

- CFD technology used predicts results close to experimental observations.
- Time, cost and risk involved in CFD simulation are substantially lower than experimental methods.
- Representation of missile motion and trajectory at any required time steps.

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