Aerodynamics of Tesla Cybertruck using OpenFOAM

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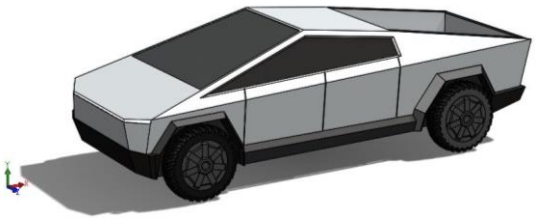
ABSTRACT

The aim of this Case Study is to check design of Cybertruck from Tesla in the aerodynamic point of view using OpenFOAM CFD Simulation. The Fuel Economy of a pickup is directly dependent to the Drag force created by the air flow over it. Conventional Pickup trucks like RAM 1500 & Ford F150 have Drag Coefficient of 0.357 and 0.40, Unconventionally, Elon Musk claims that the new Cybertruck can achieve a drag Coefficient of 0.30, though it has a box like design and a Flat front. This aspect of the low Drag Coefficient will be tested for in this Case Study. Geometry used is the original design of vehicle. Structured mesh is generated using blockMesh and snappyHexMesh. Contour of co-efficient of drag and lift is to be evaluated.
Keywords: Cybertruck Aerodynamics, Drag Coefficient, CFD, openFOAM



Objectives:
To obtain the Drag Coefficient of flow over the Cybertruck by CFD Simulation. The Simulation will be a Turbulence model. Plotting the coefficient of drag and lift which would be extracted from the Results**.** A streamline of the flow and a suitable animation would be made.

Initial Conditions and Solver:
Velocity of Cyber truck: 40 – 60 MPH (18 – 27 m/s)
Static Pressure (P_s)= 101325 N/m^2
Density (ρ) = 1.225 Kg/m^3
Kinematic Pressure: 82,714 m^2/s^2
Solver: Large time-step transient solver for incompressible Turbulent flow (pimpleFoam)
Convergence criteria – 1e-6 to 1e-8

Useful Links
1. Simulation by Justin Martin:https://electrek.co/2019/11/25/tesla-cybertruck-aerodynamics-cfd-rendering/
2. Cad Model Retrieved from : https://grabcad.com/
3. What Elon Musk says: https://insideevs.com/news/385856/tesla-cybertruck-aerodynamic-coefficient-03/
4. https://www.greencarreports.com/news/1126288_tesla-cybertruck-aerodynamics-could-bebetter-than-other-trucks-suggests-musk