

ABSTRACT

The present thesis aims to study the fluid dynamics of the underbody of a passenger vehicle. The main model of study which has been chosen is the Ahmed model, while the under-center surface will be redesigned in scale later on. This is followed by a comparison between the initial and the final model.

Chapter 1, unravels the history of car aerodynamics dating from the 19th century until today. In addition, the underbody aerodynamics which are the highest in usability by the automotive industry, are being examined.

Chapter 2, refers to the theorems and equations that have been used in the particular thesis, for the purpose of calculating different parameters, such as forces, pressures and velocities.

Chapter 3, portrays the comparison between the theoretical and computational solution in respect of mass of air flowing in a ten meter pipe. This is done in order to enable the archiving of valid results taken from the software SolidWorks and its application, Flow Simulation. Moreover, the thesis includes calculations regarding Drag Force, Coefficient of Drag C_d and Coefficient of Lift C_l for the initial and final Ahmed model.

Chapter 4, draws a comparison between the computational solutions of the initial and the redesigned Ahmed model for 40 km/h and 110 km/h. Furthermore, for each case graphs of velocity vectors, velocity and pressure distribution are included.

As a closing point the conclusions that resulted from the whole study based on the simulations and calculations that have taken place, are presented