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Aerodynamic Design Optimization of Ferrari F430 Flying Car with Enhanced Takeoff Performance

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Abstract : The designer of any flying car has the major concern on the creation of upward force with low takeoff velocity, with minimum drag, coupled with better stability and control warranting its overall high performance both in road and air. In this paper, 3D numerical simulations of external flow of a Ferrari F430 fitted with different NACA series rectangular wings have been carried out for finding the best aerodynamic design option in road and air. The principle that allows a car to rise off the ground by creating lift using deployable wings with desirable lifting characteristics is the main theme of our paper. Additionally, the car body is streamlined in accordance with the speed range. Further, the rounded and tapered shape of the top of the car is designed to slice through the air and minimize the wind resistance. The 3D SST k-ω turbulence model has been used for capturing the intrinsic flow physics during the take off phase. In the numerical study, a fully implicit finite volume scheme of the compressible, Reynolds-Averaged, Navier-Stokes equations is employed. Through the detailed parametric analytical studies, we have conjectured that Ferrari F430 can be converted into a lucrative flying car with best fit NACA wing through a proper aerodynamic design optimization.

Keywords : aerodynamics of flying car, air taxi, Ferrari F430, roadable airplane
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