

Studies on Race Car Aerodynamics at Wing in Ground Effect

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Abstract : Numerical studies on race car aerodynamics at wing in ground effect have been carried out using a steady 3d, double precision, pressure-based, and standard k-epsilon turbulence model. Through various parametric analytical studies we have observed that at a particular speed and ground clearance of the wings a favorable negative lift was found high at a particular angle of attack for all the physical models considered in this paper. The fact is that if the ground clearance height to chord length (h/c) is too small, the developing boundary layers from either side (the ground and the lower surface of the wing) can interact, leading to an altered variation of the aerodynamic characteristics at wing in ground effect. Therefore a suitable ground clearance must be predicted throughout the racing for a better performance of the race car, which obviously depends upon the coupled effects of the topography, wing orientation with respect to the ground, the incoming flow features and/or the race car speed. We have concluded that for the design of high performance and high speed race cars the adjustable wings capable to alter the ground clearance and the angles of attack is the best design option for any race car for racing safely with variable speeds.

Keywords : external aerodynamics, external flow choking, race car aerodynamics, wing in ground effect

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