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Effect of Spherical Depressions on Hatchback Cars: A CFD Study SOURAJIT BHATTACHARJEE, VISHESH KASHYAP, PRIYANSHU MITTAL, B.B. ARORA, Delhi Technological University — A major reason for the development of form drag is vortices generated due to flow separation. This greatly affects the aerodynamics of light vehicles such as hatchback cars. Flow separation may be delayed by the creation of spherical depressions at various locations on the vehicle body, which could lead to a decrease in the form drag. Through a series of studies, the effect of spherical depressions of aspect ratios 2, 4, 6 and 8 was studied separately on the bonnet, doors and roof of a generic hatchback car. 3-D CFD analyses were performed using ANSYS Fluent using a validated computational model. The trends for drag force and drag coefficient with aspect ratio were observed to vary with change in the location of the depressions. While an aspect ratio of 4 delivered the greatest decrease in drag for the bonnet, an increasing trend was observed for the other 2 locations. At higher aspect ratios, the drag was observed to be higher than for the car without depressions. The studies demonstrated the effect of spherical depressions on hatchback cars and elaborated on the importance of location as well as aspect ratio as factors to be considered for low aerodynamic drag.

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