A study on unsteady vortical structures and substantial drag reduction

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Abstract

It is known that a wake has an influence on aerodynamic drag of 2Box vehicle. The clarification of structure of wake had difficulty by using a steady calculation and experiment, because of unsteady and complexity flow in the wake.

The target of this study is to clarify the structure of wake using the highly accuracy Large Eddy Simulation (LES) on Earth Simulator.

From the comparison of each vortex structure of three 2Box models in the wake which calculated using LES on Earth Simulator, it was confirmed that there is a correlation between aerodynamic drag and the vortex structure in the wake. And it was presumed that the instability of the turbulent boundary layer separated from the vehicle contributes to the formation of the vortex structure.

Keywords: Car, Aerodynamic, Unsteady Flow, LES, Aerodynamics Drag, Vortex