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Passive Control of Turbulent Flow behind a Model Vehicle for Drag Reduction Using Wake Disrupter

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Both wind-tunnel experiment and large eddy simulation (LES) are carried out to examine the applicability of a new passive device, wake disrupter, to flow over a model vehicle for drag reduction. The wake disrupter is a small-size rectangular body attached to a part of the trailing edge of the model vehicle, designed to perturb an essentially two-dimensional nature of wake. A pair of wake disrupters is mounted on the mid-span at the upper and lower trailing edges. Experiments are performed at the Reynolds numbers of 20000, 40000 and 80000 based on the free-stream velocity and vehicle height. From the parametric study, it is found that the increase in the base pressure is about 20% with an optimal wake disrupter. From LES, it is shown that the wake disrupter significantly changes the wake structures and increases the base pressure of the model vehicle.

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