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Aerodynamics of Drag Reduction Devices for Semi-Trucks JASON ORTEGA, KAMBIZ SALARI, Lawrence Livermore National Laboratory — An increasing number of semi-trucks throughout the United States are being retrofitted with aerodynamic drag reduction devices to improve the vehicle fuel economy. Such devices typically include both trailer skirts and boattails to mitigate trailer underbody drag and base drag, respectively. Since full-scale measurements of the device performance are especially prone to experimental noise due to the effects of the driver, route, payload, or atmospheric conditions, more precise data must be obtained within a wind tunnel. In this experimental study, the wind-averaged drag coefficient is measured for a detailed 1/8th scale semi-truck model. The Reynolds number based upon the vehicle width is $1.7e6$. A number of trailer skirt and boattail device configurations are considered, as well as the effects of the boattail deflection angle. The results of this study demonstrate that a combination of a trailer skirt and boattail reduces the aerodynamic drag of a semi-truck by as much as 25%. If such a combination were applied to each of the semi-trucks throughout the United States, several billion dollars in fuel savings could be achieved each year. This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344. LLNL-ABS-657810.

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