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Drag reduction of a heavy vehicle by means of a trailer underbody fairing JASON ORTEGA, KAMBIZ SALARI, Lawrence Livermore National Laboratory — On a modern heavy vehicle, one of the sources of aerodynamic drag is trailer underbody drag, which arises due to flow impingement upon the trailer wheels and flow separation downstream of the pseudo-backward facing step formed by the tractor drive wheels, chassis, and trailer underbody. In an effort to mitigate this source of drag, trailer side skirts, which are flat panels suspended on either side of the trailer underbody, have been previously evaluated in a number of wind tunnel, track, and on-the-road studies. Although the skirts have been shown to reduce the vehicle drag coefficient by as much as 0.04, they have not been widely accepted by the heavy vehicle industry due to a number of operational deficiencies in the skirt design. To overcome these deficiencies, we are investigating the performance characteristics of an alternate drag reduction device, which is comprised of a tapered fairing located on the trailer underside. RANS simulations have demonstrated that the fairing surface promotes re-attachment of the separated flow downstream of the tractor drive wheels and chassis, thereby reducing the drag coefficient by an amount as much as that of side skirts. These computational results will be validated by conducting a wind tunnel study of a full-scale heavy vehicle that employs fairings of varying length and design. This work performed under the auspices of the US DOE by LLNL under contract DE-AC52-07NA27344.

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