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Editorial

# Editorial note on A field study on the aerodynamics of freight trains

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## EDITORIAL

A field study on the aerodynamics of freight trains to determine the aerodynamic efficiency of shipping containers loaded on intermodal freight trains, a novel full-scale field test was performed. In the sense of surface pressure, weather stations, and GPS data sets, the aerodynamic efficiency of an instrumented 48 ft container located 185 m downstream of the locomotive is evaluated. There have been previous research on train aerodynamics. Previous research on train aerodynamics has largely been limited to low-resolution, reduced-order, and scaled field, numerical, and wind-tunnel studies. The goal of this study was to see how well this new field-based approach could determine the aerodynamic efficiency of full-scale train containers under a variety of conditions. The calculated surface pressure distributions on the front and base of the container are close to those of previous work in low wind conditions where the yaw angle is expected to be low, but the magnitude of the drag coefficient was much lower, by up to 65 percent. This indicates that previous research hasn't gone into enough detail about the drag profile of containers located far downstream. A new propeller called Boxprop, with blade tips joined in pairs, is planned and optimised for a conceptual electric aircraft using an effective framework for optimization. The Boxprop with optimum efficiency is down-selected from the Pareto front of thrust coefficient and propeller efficiency in accordance with the thrust requirement of the electric aircraft at cruise. Subsequently, the aeroacoustic analysis performed by the Reynolds-Averaged Navier Stokes (RANS) hybrid integral system and the Williams and Hawkings (FW-H) convected Ffowcs (FW-H) equation shows that the tonal noise from the Boxprop with three joined cruise blades is similar to a traditional three-bladed propeller, but greater than a conventional six-bladed propeller. Although the Boxprop's joined-blade tips have suppressed tip vortices, the resulting tonal noise reduction is not noticeable. First, the noise of Boxprop at take-off is discussed. Unsteady RANS is a technique for overcoming varying flow structures that become dominant during take-off. The angle of attack (AOA) is found to be a significant factor affecting the production of noise. The Boxprop's AOA effects follow a similar pattern to a traditional propeller. The results for Boxprop aeroacoustics have strengthened our understanding of tip-vortex suppression techniques in relation to tonal noise generation, which will be extremely useful in future Boxprop aeroacoustic designs for electric aircraft. The ultimate goal of developing a practical propulsion system using detonation is to produce thrust effectively. Since pressure gain combustion is created while detonations rotate within the chamber, the rotating detonation engine demonstrates its enormous potential. Investigations have been carried out in order to enhance the propulsive efficiency of the rotating detonation engine. For the rotating detonation chamber, a method of designing aerospike nozzles was suggested. At various design points, three aerospike nozzles were designed with different geometry structures, including conical and flat configurations and design pressure ratios. In the combustion chamber with nozzles, three operation modes have been obtained compared to the nozzle-less condition.

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