

Abstract Submitted
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Hybrid flow control of a transport truck side-mirror using AC-DBD plasma actuated guide vane THEODOROS MICHELIS, MARIOS KOTSONIS, Delft Univ of Tech — A wind-tunnel study is conducted towards hybrid flow control of a full-scale transport truck side-mirror ($Re = 4 \times 10^5$). The mirror is mounted on a structure that models the truck cabin. PIV measurements are performed at a range of velocities from 15 to 25m/s and from leeward to windward angles of -5° to $+5^\circ$. A slim guide vane of 6cm chord is employed along the span of the hub of the mirror for redirecting high momentum flow towards the wake region. Separation from the leading edge of the guide vane is reduced or eliminated by means of AC-DBD plasma actuator, operating at voltage of 35kV peak-to-peak and frequency of 200Hz. Time-averaged velocity fields are obtained at the centre of the mirror for three scenarios: a) reference case lacking any control elements; b) guide vane only and c) combination of the guide vane and the AC-DBD. The comparison of cases demonstrates that at 25m/s windward conditions (-5°) the guide vane is capable of increasing momentum (+20%) in the wake of the mirror with additional improvement when plasma actuation is applied (+21%). In contrast, at leeward conditions ($+5^\circ$), the guide vane reduces momentum (-20%), though with actuation an increase is observed (+5%). Total recovered momentum is 25%.

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