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Unsteady wake of a rotating tire[1] JEAN-ELOI LOMBARD, DAVE MOXEY, HUI XU, SPENCER SHERWIN, Imperial College, SHERWIN LAB TEAM — For open wheel race-cars, such as IndyCar and Formula One, the wheels are responsible for 40% of the total drag. For road cars drag associated to the wheels and under-carriage can represent 60% of total drag at highway cruise speeds. Experimental observations have reported two or three pairs of counter rotating vortices, the relative importance of which still remains an open question, that interact to form a complex wake. Traditional RANS based methods are typically not well equipped to deal with such highly unsteady flows which motivates research into more physical, unsteady models. Leveraging a high-fidelity spectral/*hp* element based method a Large Eddy Simulation is performed to give further insight into unsteady characteristics of the wake. In particular the unsteady nature of both the jetting and top vortex pair is reported as well as the time and length scales associated with the vortex core trajectories. Correlation with experimentally obtained particle image velocimetry is presented.

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