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Rotating Wheel Wake JEAN-ELOI LOMBARD, HUI XU, DAVE MOXEY, SPENCER SHERWIN, Imperial College — For open wheel race-cars, such as Formula One, or IndyCar, the wheels are responsible for 40% of the total drag. For road cars, drag associated to the wheels and under-carriage can represent $20-60\%$ of total drag at highway cruise speeds. Experimental observations have reported two, three or more pairs of counter rotating vortices, the relative strength of which still remains an open question. Thenear wake of an unsteady rotating wheel. The numerical investigation by means of direct numerical simulation at Re_D=400-1000 is presented here to further the understanding of bifurcations the flow undergoes as the Reynolds number is increased. Direct numerical simulation is performed using Nektar++,the results of which are compared to those of Pirozzoli et al.(2012).Both proper orthogonal decomposition and dynamic mode decomposition, as well as spectral analysis are leveraged to gain unprecedented insight into the bifurcations and subsequent topological differences of the wake as the Reynolds number is increased.

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