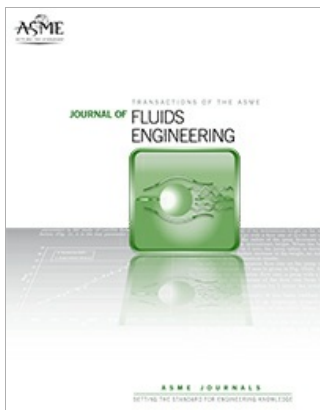




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FLOWS IN COMPLEX SYSTEMS

# An Aerodynamic Investigation of an Isolated Stationary Formula 1 Wheel Assembly

Emin

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The flowfield around a 60% scale stationary Formula 1 tire in contact with the ground in a closed wind tunnel at a Reynolds number of 500,000 was computationally examined in order to assess the accuracy of different turbulence modeling techniques and confirm the existence of large scale flow features. A simplified and replica tire model that includes all brake components was tested to determine the sensitivity of the wake to cross flow within the tire hub along with the flow blockage caused by the brake assembly. The results of steady and unsteady Reynolds averaged Navier-Stokes (URANS) equations and a large eddy simulation (LES) were compared with the experimental data. The LES closure and the RANS closure that accounted for unsteadiness with low eddy viscosity (unsteady kw-SST) matched closest to the experimental data both in point wise velocity comparisons along with location and intensity of the strong counter-rotating vortex pair dominating the far wake of the tire.

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