

# **Aerodynamic Drag Between Two Cyclists: Effect of Wheel Rotation**

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## **Abstract**

The aerodynamic drag force acting on a cyclist is dependent on several factors such as speed, wind magnitude, wind angle and/or drafting a second cyclist or group of cyclists. To increase knowledge in drag reduction mechanisms associated with drafting conditions, the aerodynamic drag of two female track cyclists was simulated in static and with simulated wheel rotations by means of validated numerical approaches (computation fluid dynamics, CFD). In total two sets of 11 simulations with wheel-to-wheel distance ranging from 5 centimeters to 5 meters were carried out using the RANS method associated with the k-omega SST turbulence model performed on the OpenFOAM CFD software. Results show that wheel rotation had a significant influence on both the leading and trailing cyclist aerodynamic drags compared with static simulations. These results suggest the implementation of wheel rotation and accurate body shape reconstruction by means of 3D scanning in future CFD models of cycling to make them more realistic with low additional computational cost.

## **Keywords**

Computational fluid dynamics  
Wind tunnel  
Aerodynamic drag  
Track Cycling