

Motorbike Aerodynamics

Advancing Sports Engineering

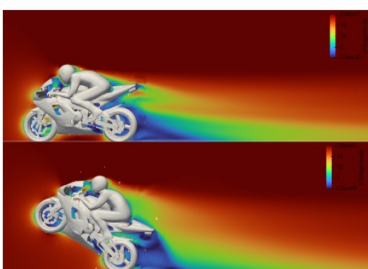
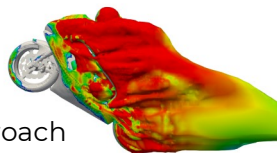
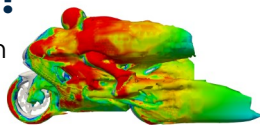
At [SynergySim](#), we specialize in applying advanced fluid dynamics to sports engineering, optimizing designs for performance and aerodynamics. From motorbikes to athletic gear, our simulations enhance speed, stability, and efficiency. By leveraging cutting-edge tools, we deliver innovative solutions that drive advancements in sports technology and athlete performance. Below is an example showcasing two different approaches to analyzing air dynamics using the RANS and LES methods for wheelie and non-wheelie scenarios of a motorbike.

Project Overview

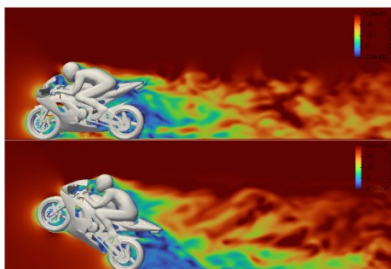
This project aims to investigate the aerodynamic differences between a motorbike in a wheelie position and a standard riding posture using advanced Computational Fluid Dynamics (CFD) techniques. The study employs **Reynolds-Averaged Navier-Stokes (RANS)** for steady-state simulations and **Large Eddy Simulation (LES)** for detailed, airflow analysis. The results will deliver a comprehensive understanding of the aerodynamic performance and stability trade-offs associated with the wheelie maneuver, guiding design improvements. ®

What can we expect?

- ⇒ Detailed Airflow Visualization
- ⇒ Aerodynamic Force Analysis
- ⇒ Flow Behavior Comparison
- ⇒ Stability Assessment
- ⇒ High-Fidelity Simulation Approach



RANS



LES

Key Highlights

Challenges

- Complex flow patterns: Accurately capturing turbulent airflow and wake dynamics.
- Complex geometry: Modeling intricate details of the motorbike, such as tires, suspension, and bodywork, which affect airflow dynamics.
- Data Resolution: Balancing the need for high-resolution results with manageable computational resources in detailed LES simulations.

Approach

- Air-Flow Simulation: Using advanced CFD tools to simulate external airflow under different conditions.
- Parametric: Refine motorbike geometry and rider positioning to minimize drag, enhance stability, and maximize speed.

Outcome

- In-depth visualizations of airflow patterns.
- Insights into turbulence and wake effects.
- Advanced Simulation techniques.
- A comprehensive comparison of aerodynamic parameters for different scenarios.

