

Motorcycle Lap Simulation

Motorcycle Design & Innovation (ACHA6007)

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07/12/2025

Introduction

This assignment develops a physics-based lap-time simulation for an Aprilia RS660, using high-performance track data as the primary reference. A processed GPS track model, empirical tyre limits and a parameterised bike setup are combined in a forward–backward solver to generate a self-consistent velocity profile. The simulated lap is then validated against the logged data, and key limitations are identified to guide further improvements.

Order of Operations & Key Points

1. **trackmodel_2300783.mlx**
 - Uses circuit reference file (.csv), selectable from drop-down menu in the script.
2. **tyremodel_2300783.mlx**
 - Will require folder 'Tyre Model Data' when asked.
3. **driveforce_2300783.mlx**
 - Uses dyno data file (.csv).
4. **bikesetup_2300783.mlx**
5. **lapsim_2300783.mlx**
6. **plotting_2300783.mlx**
7. **comparison_2300783.mlx**

Notes

Always keep this folder open in MATLAB as the current working folder.

This simulation was developed for Donington Park, so simulations using other circuits may give varying results and contrast to the written analysis.

All figures are designed to be viewed in light mode, and in a separate window.

References

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