Control of Mobile Robots - Laboratory 2
Kinematics and Dynamics of mobile robots
Prof. Luca Bascetta

Exercise 1

Using ROS nodes developed during Laboratory 1, compare the results obtained from the bicycle kinematic and dynamic simulators when the robot commands are computed based on the eight-shaped trajectory.
Do the kinematic and dynamic models yield the same results? Under which assumptions?

Exercise 2

A circular trajectory can be described in parametric form as follows

$$x = R\left(\cos\left(\frac{2\pi}{T}t\right) - 1\right)$$
$$y = R\sin\left(\frac{2\pi}{T}t\right)$$

where R is the radius, and T the time duration of each lap.
Using again the ROS nodes developed during Laboratory 1, compare the results obtained from the bicycle kinematic and dynamic simulators when the robot commands are computed based on this circular trajectory.
In particular, for the dynamic simulator compare the results achieved with a linear tyre model, and a Fiala tyre model with saturation.
How do this results change if ω increases? What is the maximum value of ω for which tyre forces saturate? Why?