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VEHICLE DYNAMIC SIMULATION USING ROBOTIC TECHNIQUES

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Dynamic behavior study and analysis are very important for improving vehicles safety, comfort, handling and performance. In order to diminish the cost of price and to proceed quickly, engineers execute tests on new designed or modified vehicle different parts on a virtual environment. This kind of simulation of vehicle dynamic is also important, for example, for both forensic expert who needs to reconstruct a road accident scenario and for vehicle game developer. However, to simulate a vehicle dynamic behavior, one has to establish its dynamic model. This one is also used to control unmanned vehicles and to plan their path.

In this paper we present the technic used to establish the dynamic model of a car. This technic is inspired from those developed in robotics for the sake of modeling variety types of industrial robots. Indeed, we can consider the car as a multibody poly-articulated system where the base is the chassis and terminal links are the wheels. The geometric description is realized using the Modified Denavit and Hartenberg (MDH)(Figure 1) method and the dynamic model is obtained by recursive Newton-Euler algorithm adapted for mobile-based robot.

Tyre behavior is also considered here using the linear tyre model.

The developed and implemented model is validated by comparing kinematic and kinetic variables, obtained by different scenario execution, with those obtained with PC-Crash software.

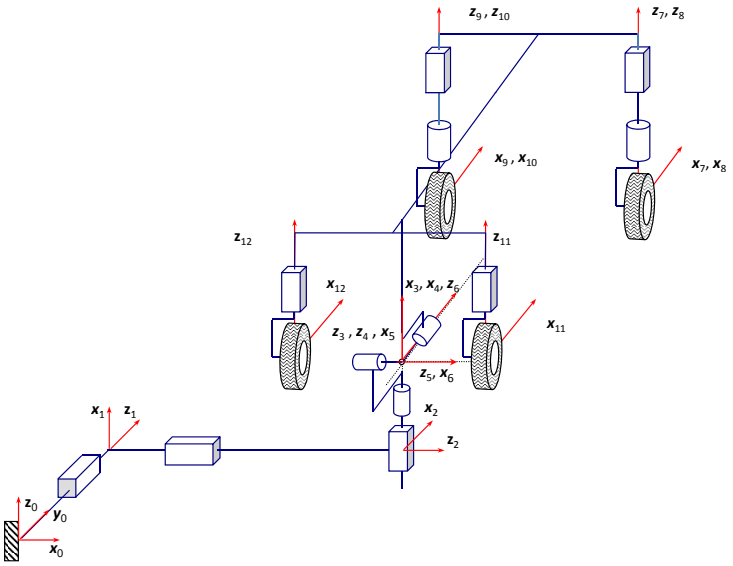

Figure 1: MDH four wheels model geometric description.

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