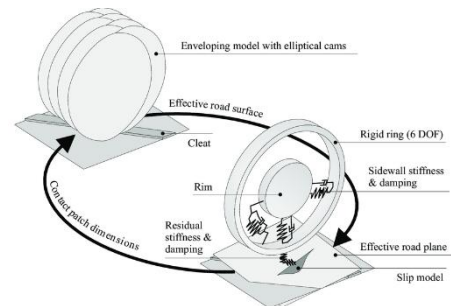


Master / Bachelor thesis

Study of Tire envelope effect on vehicle comfort during a virtual simulation

Background:

The tire plays a fundamental role in determining the dynamic behavior of a vehicle suspension system. In conventional virtual suspension simulations, the tire is often represented using simplified single point contact and /or a mechanical model. However, the actual tire undergoes significant deformation when subjected to vertical loads, steering, braking, and lateral forces. The resulting change in the tire envelope can influence suspension kinematics, wheel clearance, suspension travel, and the overall dynamic response of the vehicle.



This thesis aims to investigate the tire envelope effect and its influence on the virtual simulation of vehicle suspension systems. The objective is to evaluate how tire deformation and the resulting change in tire geometry affect suspension performance and the accuracy of simulation results. With suitable tire and vehicle data, the simulation results will be correlated with analytical calculations, tire data, or physical measurements. The expected outcome of the thesis is a quantitative assessment of the importance of tire envelope modeling in virtual suspension development. The study will identify situations in which a simplified tire model is sufficient and conditions where a deformable or envelope-based tire representation provides significant improvements in simulation accuracy. The results can contribute to improved and accurate virtual development methods for vehicle suspension systems during a development process.

Tasks:

- Research and selection of a suitable virtual Tire model
- Perform measurements and parameterize a virtual tire model
- Integrating the developed tire model into a virtual vehicle model
- Verification and Validation of the model

Required profile:

- Study in the field of Mechanical, Mechatronics or Automotive engineering
- An independent and structured approach to work
- Prior knowledge of automotive engineering and mathematical modelling necessary

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