

Objective

Optimizing the rolling resistance and tire wear are some of the key elements to reduce the vehicle emissions and costs i.e. optimizing the fuel economy and tire life cycle which will achieve **ECO² aspects**.

Reducing rolling resistance



Since '70s many efforts have been performed to optimize the tire compound and its structure in order to reduce the rolling resistance. Here, this is approved by active control of chassis parameters i.e. camber, toe, compliances and so on, which is realized by integrating innovative chassis components like wheel corner module and in-wheel motor.

Approach

The project is split into two phases. The initial focus is on modeling the ECO² criteria and partly, analyzing the possible functions of wheel corner module. The emphasis on vehicle dynamics, control strategy and light weight concept will be followed in the second phase.

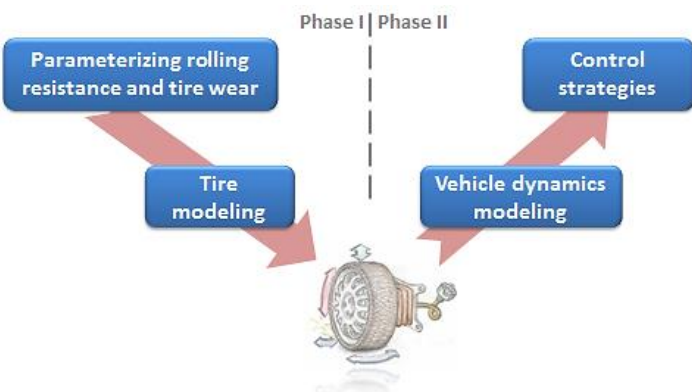


Figure 1. Research strategy and problem approach

Results

The final and main result of this phase is; generation of the **ECO² Tire model** for rolling resistance and wear investigations. This model provides a more detailed understanding of energy dissipation in the tire structure due to periodic deformation of tire-road contact elements. Furthermore, the fuel economy and tire wear are parameterized for later investigation of ECO² criteria.

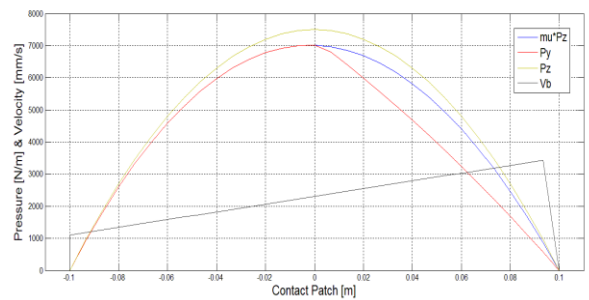


Figure 2. Behavior of a bristle in tire-contact region from Brush Tire Model

Future work

In pace of the project, the near term focus is on;

- Parameter identification of the tire model
- Full vehicle simulations
- Field tests using RCV
- Validation of the loss model

Furthermore, three important and conflicting properties of tire performance i.e. *wet traction*, *wear resistance* and *rolling resistance* could be balanced using the **ECO² lightweight chassis concept**.

