Extended brush model for rolling resistance

The Swedish National Road and Transport Research Institute (VTI) has an opening for a master thesis student in Linköping at the Vehicle Systems and Driving Simulation unit (FSK). The objective of the master thesis is to further develop an extended tire brush model for estimation of rolling resistance.

VTI

VTI is an independent and internationally prominent research institute in the transport sector. Its principal task is to conduct research and development relating to infrastructure, traffic and transport and its operations include all modes of transport. VTI has about 200 employees and is located in Linköping (head office), Gothenburg, Stockholm and Lund.

Background

Tyre rolling resistance contributes to the greenhouse gas emissions caused by road transports, which makes the reduction of rolling resistance a priority. The rolling resistance of a tyre is influenced by several factors, temperature being one of the more prominent ones.

Rolling resistance models are important for better understanding of rolling resistance and performing vehicle analysis. Many of the existing tyre models are complex models such as finite element models which require material testing and a lot of computational power. For full vehicle simulations, a simpler analytical model can be beneficial. Extended brush model is an example which exist in the literature.

Purpose of thesis

The objective of this thesis is to further develop the extended brush model and to parametrise it using measurements from VTI tyre testing facility. The model should also capture effects of tyre temperature on rolling resistance.

Work outline

The thesis work is planned to start in January 2022 and includes the following tasks:

- Literature reading on the topic
- Further development of the extended brush tire model to capture effects of temperature/speed/load on rolling resistance
- Parameterizing the model using measurements from VTI's tyre testing facility
- Writing and presenting conclusions

Qualification

- Engineering background within the areas of vehicle dynamics, mathematical/physical modelling, control, signal processing or a similar area
- Ability to work independently and to take initiatives
- Experience of programming and simulation in Matlab
- Language proficiency: fluent English and/or Swedish

Application instruction

Deadline: Dec 20, 2021
Send your application with CV to Sogol Kharrazi (see email below)

For more information contact:
Sogol Kharrazi, VTI/LiU sogol.kharrazi@vti.se
Mattias Hjort, VTI mattias.hjort@vti.se
Jan Åslund, jan.aslund@liu.se, Vehicular Systems, LiU