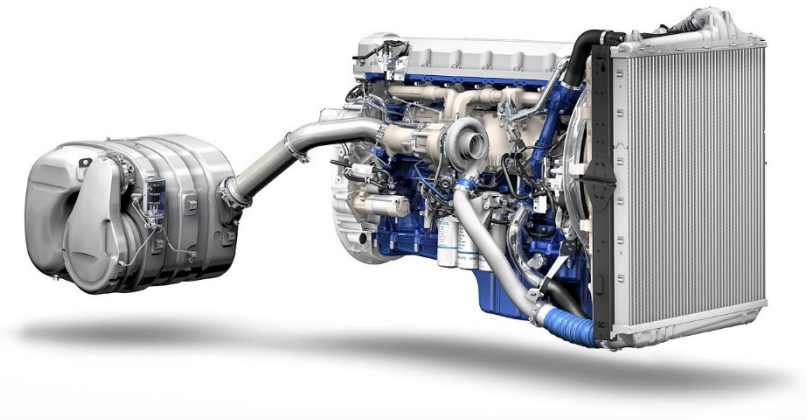
MSc thesis project proposal 2021/2022

Kinetic modeling of soot oxidation inside diesel particulate filter (DPF)

Emissions of particulate matter is a severe threat to the environment and human health. PM consists mostly of soot which is produced due to incomplete combustion. As a result of particulate emissions, diesel particulate filters (DPF) have become one of the main components in the exhaust after treatment system for diesel engines. Particulate matter (PM) is physically filtered by the porous wall of the material which results in accumulation of PM both inside and on the filter wall. Subsequently, the PM is oxidized by either O_2 or NO_2. The filtration efficiency depends on the accumulation of PM as well as long-term effects from ash components. This filtration efficiency is strongly coupled to the pressure drop and hence the fuel consumption penalty. The majority of PM is soot and the oxidation of soot is a complex phenomenon and to better understand the system, detailed kinetic models are highly needed. Developing numerical models for particulate filter regeneration requires a good understanding of the soot oxidation process in combination with other transport processes. Dedicated experiments are also required to get accurate models with high predictive power. High quality models for DPF regeneration is key to lower fuel consumption and reduced CO_2 emissions.



The objective of this project is to evaluate experimental data from a HD diesel engine (Volvo D13) equipped with a DPF. Using a previously developed model the model performance will be improved by parameter estimation and additional experiments. The simulations will be performed using a commercial software, *Axisuite* developed by Exothermia and coupled to on-going research at Chalmers.

About you:
The project will be performed at the division of Combustion and Propulsion Systems (CaPS), department of Mechanics and Maritime Sciences, Chalmers. The project is suitable for two students with the ability to work independently and creatively. Suitable Background is a Master's program in Chemistry, Physics or Mechanics and knowledge in mathematical modelling. A strong interest in contributing to improved environment and human health is of course necessary.

Project start: Autumn 2021 or latest in January 2022

Contact persons:
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