Modelling of a switching arc in a DC contactor for applications in electric vehicles

Master or Bachelor thesis

Modern electric vehicles are exposed to high power flows due to fast charging techniques. To realize this, higher battery voltages of up to 800 V are increasingly used. In order to guarantee the safety of both the driver and the electric vehicle, DC power contactors are used to safely interrupt operating and fault currents. To switch these currents, a contact is opened, which causes an electric arc to form. The arc is extinguished by sufficient cooling and extension of the arc. Due to the highly dynamic behaviour of the switching arc, the physical processes taking place can hardly be measured. For this reason, CFD simulations are used to simulate the physical processes, on the basis of which conclusions can be drawn for the development of DC power contactors.

In this thesis an existing CFD simulation of a switching arc in the software ANSYS Fluent is to be further developed. For this purpose, different heat radiation models will be compared and evaluated with respect to their applicability.

Goals and Focus of the thesis:

- Familiarization with CFD simulations and heat radiation modelling
- Further development and adaptation of an existing CFD simulation in ANSYS Fluent
- Comparison of different heat radiation models

Your Profil:

- Study in Engineering or Business Administration & Engineering or Computer Sciences
- Interest in physical-mathematical problems
- Programming knowledge advantageous

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Focus

- DC switching arcs
- CFD/ Electromagnetics
- Simulative studies