State-space Modeling of Air Condition System in Automotive Applications

Automotive air condition system provide thermal comfort for the vehicle passengers. In general, air is supplied from the outside the passenger compartment, then it is filtered, cooled, dehumidified, heated and distributed into the passenger compartment in different outlets depending on ambient conditions. Current AC systems have operational flexibility and are highly automated, to improve the development of AC softwares, we require a dynamic model of the mass and heat transfer processes involve.

The focus in this thesis work is to develop a dynamic model of a simplified air condition system that could serve as a representation of the AC system simulator. The AC system is composed of a number of interconnected subsystems; compressor, condenser, evaporator and expander. The medium of the AC cycle or refrigerant, is pressurized in a compressor, condensed in condenser, subsequently passed through an expander and finally evaporated in a heat exchanger.

The work starts by a literature study, to obtain sufficient understanding of such a system and identification of important system requirements. Later, 1-D thermal analysis of the system is performed in GT-SUITE, the state equations of each component are extracted and a full dynamic system will be simulated in Matlab/Simulink.

The Master thesis work is carried out for Volvo cars in collaboration with ÅF Göteborg. You will be stationed at Volvo Cars, Torslanda, in the group “Climate control and CAE”, and will be supervised by ÅF consultant Dr. Amir Movaghar. The work is intended to start in January 2019, or as soon as possible, and finish after 20 weeks of full time work (before the summer).

For further questions contact Amir Movaghar or Jan Östh at ÅF via the email below.
Send your application (CV, personal letter, list of courses) on the following webpage:

http://www.afconsult.com/en/join-us/available-jobs/10099-master-thesis-spring-2019-30-hp-state-space-modeling-of-air-condition-system-in-automotive-applications/

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