



Workshop Title : Modeling and Control of Turbocharged Engines

Workshop Manager :

Name : Lars Eriksson

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Summary of the workshop and general schedule :

This two day interactive tutorial will give you an introduction to modeling and control of turbocharged combustion engines. You will learn about mean value engine modeling (MVEM), parameter estimation, model validation, downsizing, turbocharging, powertrain control systems, implementation issues and more. The emphasis will be on turbocharging. You will build and validate your own turbocharger model, if you have your own turbocharger data you can use that to build your model. You will also get to build a boost pressure controller for your turbocharger in a MVEM framework using Matlab®/Simulink®. This is a chance to meet and learn from some of the very best in the field of turbocharging and you can expect a great learning experience and lots of fun.

Prerequisites for the hands-on tutorial: To be able to participate in the tutorial the participant need to have computer with Matlab and Simulink installed, no other special packages are needed.

Day 1:

The module starts with an introduction to engine modeling for control, with a focus on component based mean value engine models. We'll go through the basics of engines and turbochargers and their modeling. The module will cover both engine model equations as well as parameter estimation. In the afternoon we'll dive into turbocharger modeling and in a hands on workshop develop a complete model. Those that have their own engine and turbocharger data can bring it and work with it in the module.

Day 2:

Day two will be focused on engine control and starts with the torque based structure and then transitions to turbocharger control. During the hands-on sessions the participants will construct a boost pressure controller that uses both the throttle and the wastegate actuators for torque control.



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Lecturer #1 :

Name : Lars Eriksson

e-mail address : lars.eriksson@liu.se

Schedule: Participates during the entire workshop.

Brief biography :

Professor Eriksson is currently managing the engine laboratory at vehicular systems. His research interests are modeling, simulation, and control of internal combustion engines for vehicle propulsion in general, but with a focus on downsizing and supercharging concepts for improved fuel economy. His contributions are foremost on engine control and control oriented modeling of combustion engines. He has published one book, three book chapters, and 132 international peer reviewed conference and journal papers. As the manager of the engine laboratory he has developed a well established network of contacts with research groups both in academia and in industry.

Summary of the contribution #1:

Professor Eriksson will be the main lecturer for the module and also participate as an assistant in the hands-on exercises.



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Lecturer #2 :

Name : Robin Holmbom

e-mail address : robin.holmbom@liu.se

Schedule: Participate during the entire workshop.

Brief biography :

Robin Holmbom is a Ph D student at Vehicular Systems with a research interest in advanced air charge systems and their estimation and control. In the research Mr Holmbom has been collaborating with Volvo Cars. Mr Holmbom is also a teaching assistant and teaches in the engine and driveline course at LiU where this module has its foundation.

Summary of the contribution #2:

Mr Holmbom will participate as teaching assistant in the hands on training modules and contribute to the lectures on modeling of gas flows.



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Lecturer #3 :

Name : Kristoffer Ekberg

e-mail address : kristoffer.ekberg@liu.se

Schedule: Participates during the entire workshop

Brief biography :

Kristoffer Ekberg is a Ph D student at Vehicular Systems with a research interest in Powertrain control with electrified turbochargers, the direction is about the interplay between engine control strategies and vehicle fuel economy and acceleration performance. In the research Mr Ekberg has been collaborating with Volvo Cars. Mr Ekberg is also a teaching assistant and teaches in both the engine and driveline course at LiU, where this module has its foundation, and courses related to electrification.

Summary of the contribution #3:

Mr Ekberg will participate as teaching assistant in the hands on training modules and contribute to the lectures on torque based control and its interplay with vehicle acceleration performance.

