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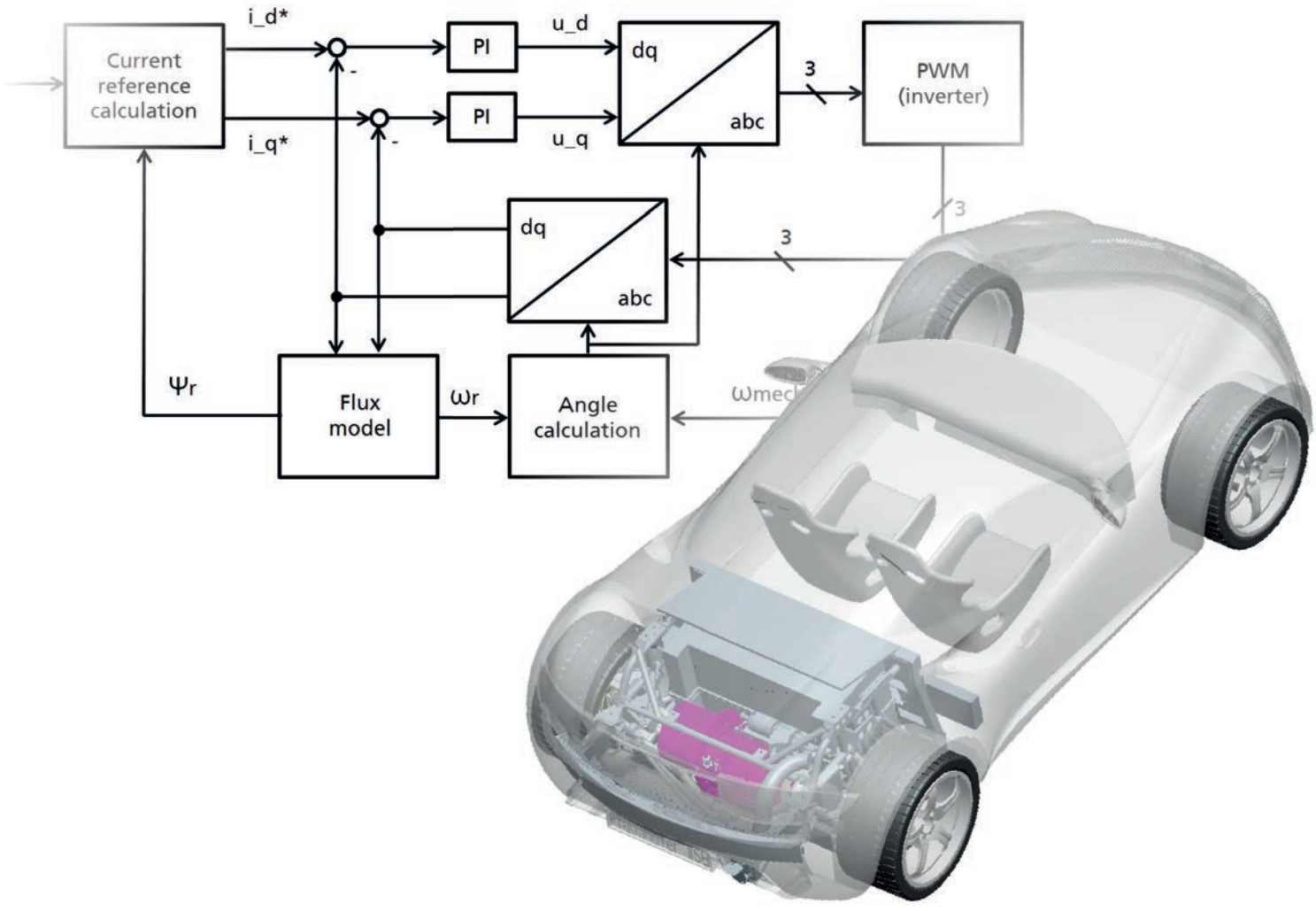
FRAUNHOFER INSTITUTE FOR INTEGRATED SYSTEMS AND DEVICE TECHNOLOGY

Electrical Drive Control Systems



In cooperation with the Laboratory for Control Systems of

TECHNISCHE HOCHSCHULE NÜRNBERG
GEORG SIMON OHM

Control algorithms for inverter powered drive applications

For a safe and efficient operation of electric drive train systems, the development of adapted control algorithms is mandatory. Fraunhofer IISB offers in cooperation with the Laboratory for Control Systems of the 'Technische Hochschule Nürnberg' the development and analysis of modular control algorithms addressing for example the machine types listed below:

- Induction motors
- Synchronous motors:
    - Permanent-magnet SM
    - Brushless DC
    - Double fed SM
    - Synchronous reluctance motor
- Multiphase and multilevel topologies

The following solutions are covered by our R&D-work:

- Conventional drive control methods (e.g. field oriented control) with custom optimizations regarding efficiency, torque precision, and response behavior
- Adaptive control of drive systems (e.g. iterative learning control)

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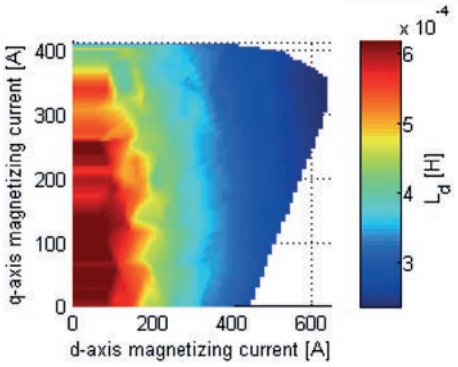
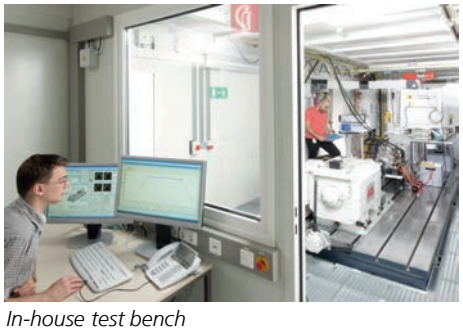


Exemplary graph for parameter identification

- Sensorless control: Algorithms for detecting the rotor or flux angle without sensors (including start-up from standstill)
- Drive parameter identification
- Suppression and active damping of harmonics (minimization of harmonic induced losses, acoustic effects and torque ripple)
- Control and operation concepts for multiphase drives with various phase numbers
- High sampling frequency control for low inductance motors and high-speed applications
- Drive control and energy management design for hybrid drive trains
- Modeling and simulation of drives and the designed control systems
- Commissioning and test of the developed drive control systems at the in-house dynamometer facilities



In-house test bench

Available hardware

For the control of highly integrated drive train systems, controlboards based on the following architectures have been developed in-house and tested:

- Infineon Tricore
- ST STM32F4

In-house developed inverter controlboard

Flexible control prototyping hardware is also used during the development stage (all with a consistent tool chain based on MATLAB/ Simulink):

- dSPACE MicroLabBox
- dSPACE MicroAutoBox
- dSPACE DS1103

Contact Us!

The Fraunhofer IISB is your research and development partner for innovative electric drives and power electronic components!