



Department "Material Characterization and Testing"

Seeing through With Millimeter, Terahertz and Optical Waves

The "Material Characterization and Testing" (MC) department develops and builds industrial-grade systems for non-destructive testing using electromagnetic waves in the spectral range from visible light to radar frequencies. The necessary laser sources, electronic circuits, emitters and detectors, particularly in the terahertz and radar range, are partly developed and improved in-house. The necessary scientific foundations include lithographic know-how (2D and 3D structuring), in-depth knowledge of linear and non-linear optics, laser physics and quantum optics.

The department is an international leader in the development of model-based evaluation algorithms for layer thickness measurement and tomography with a priori information, which allow the reliable detection of defects in the volume. With the realization of the principle of measurement with undetected photons in the terahertz range, the department has broken new scientific ground, which in the long term will make it possible to dispense with the detection of terahertz waves in general. With the development of the first laser-based optical FMCW radar, the thickness measurement of cathode and anode layers in battery production has also been achieved for the first time.



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Division "Mathematics for Vehicle Engineering"

Simulation-Supported Development and Production Optimization

The "Mathematics for Vehicle Engineering" (MF) division is divided into two departments, "Dynamics, Loads and Environmental Data" (DLU) and "Mathematics for the Digital Factory" (MDF), as well as the Tire Simulation project group and the MF Technical Center cross-sectional unit, which is responsible for testing and measurement technology.

The "DLU" department develops methods and tools for system simulation, taking into account environmental data and usage variability. In particular, the vehicle development attributes of operational stability, reliability, energy efficiency and ADAS/AD as well as the development of sustainable mobility solutions are addressed. In line with this, there is research and development in the area of vehicle-environment-human interaction and tire modeling and simulation. The "MDF" department bundles the activities for the development of software tools for virtual product development and creation.



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