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THE APPLICATION OF THE VMAP STANDARD IN VIRTUAL PROCESS CHAINS FOR CONTINUOUS FIBER REINFORCED POLYMERS

Constantin Kraus
Karlsruhe Institute of Technology (KIT) – Lightweight Engineering, Karlsruhe, Germany

Distinguished by their exceptional weight-specific mechanical properties, continuous fiber reinforced polymers (CoFRP) stand out as ideal materials for use in load-bearing components within the automotive and aviation sectors.

The macroscopic composite properties are determined by a multi-step manufacturing process. This typically involves an initial draping step, followed by the infiltration of liquid resin, and the thermochemical curing reaction within the mold. Depending on the component's shape, process parameters, and boundary conditions, significant variations in local fiber directions and constituent composition may arise within the part, leading to global and local deviations from nominal mechanical material properties.

Recognizing the potential impact of manufacturing effects on the final product, it becomes crucial to consider these effects during the component design phase. This can be achieved through a CAE chain that interlinks the various simulation modules, which are tailored to the physics, constitutive material law, and suitable discretizations of the specific process steps.

This talk focuses on the interfaces between these individual simulation modules, their implementation, and the challenges associated with them. The application of the VMAP specification and the utilization of its software library for implementing interoperable Input/Output tasks with third-party software are showcased through examples involving automotive and aviation components manufactured in the resin transfer molding process.