Development of interfaces for data exchange within a tool chain covering manufacturing process simulation and structural mechanics analysis

In the framework of a technology project a tool chain (Fig. 1), covering manufacturing process simulation (for composites) and finite element based structural analysis and optimization, will be developed. Simulation of the manufacturing process includes simulation of the draping behaviour of non-crimp fabrics, simulation of the resin infiltration process and the curing process in the autoclave or oven. Commercial and in-house tools are used for the different simulations steps. A major challenge in this context is the automatic exchange of data between the different models and tools. In order to perform data exchange a concept based on a common database in XML (Extensible Markup Language) format has been developed. The approach is that each simulation tool writes and reads data into/from the XML database via so-called wrappers. Wrappers will be developed in Python language and will be then implemented into the data flow process.

Main objective of this master thesis is to develop, implement and test wrappers for the automatic data exchange from draping, infiltration and curing simulation to structural mechanics analysis. The structural mechanics analysis will be performed within the EADS Cassidian Air Systems in-house multidisciplinary optimization (MDO) tool LAGRANGE. The developments will be finally tested on use-cases of different complexity.

In particular, the following steps have to be performed:

- Familiarising with basics of manufacturing simulations tools and methods for composites
- Familiarising with the EADS Cassidian in-house MDO tool LAGRANGE
- Implementation of Python wrappers for data exchange between the modules of the tool chain
- Testing on use cases of different complexity
- Evaluation and Documentation

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