DISSERTATION (Abstract)

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# FUNCTIONAL MODELS IN CONFIGURATION SYSTEMS

Configuration is the process of composing a technical system from a predefined set of objects. The result of such a process is called configuration too and has to fulfill a set of given constraints. A configuration system is a program that takes a set of demands as input and that computes the information about the required objects, their type, number, topology etc. such that the emerging configuration fulfills all constraints.

In many configuration systems a structural model of the domain forms the basis for the configuration process. Such a modeling approach is no longer adequate when functional connections make up a major part of the domain knowledge. This thesis examines the role of functional models in the field of configuration and contributes to this area in the following respects:

- Framework of configuration: We develop a formal framework that gives a precise methodology for studying the phenomenon of configuration from a viewpoint independent of any knowledge representation.

- Configuration based on behavior: We introduce the configuration of hydraulic systems as a problem that is founded on deep physical connections and develop efficient modeling and inference concepts to process hydraulic engineering expertise.

- Configuration systems: Aside from theoretical concepts we present two working systems, Mokon and ArtDeco, which have been developed to master real-world configuration tasks and which operationalize large parts of our concepts.