System Simulation, Transient Analysis and Reliability Analysis Based on One Model

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Unlike specialized simulation tools for dedicated physical or technical sciences (mechanical, electrical, hydraulic, thermodynamics, control design) the notion *system simulation* shall mean the investigation and computation of heterogenous systems, that comprise several subsystems of the above mentioned physical domains.

SimulationX is a tool that claims to cover these requirements. Moreover, the software supports *physical modelling* based on network description (as opposed to pure mathematical description or e.g. C code). Here one can exploit common properties (existence of so called Through and Across quantities). On the other hand, the transparency in the different physical domains is increased by supporting the individual physical entities and units.
For the the description of models the modeling language Modelica is used.

Based on one and the same model, SimulationX can perform several analysis methods, such as calculation of stationary equilibrium, transient simulation, linear analysis and input output analysis. In the latest deployment a SimulationX model forms the basis for *Fault Tree generation* and calculation of FMEA data. The approach has the potential to improve the consistency between functional design and reliability analysis. The forthcoming development will extend the technique by including optimization methods.