System behavior optimizing by tuning system parameters in engineering model

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About the topic

Recent main change in leading industries is introduction of strongly system operated industrial products. This new situation has fundamentally changed traditional engineering modeling and simulation and placed new emphasis on system level modeling of engineering structures. In this way, research is about improving system level behavior representations using principle of system parameters optimizing in engineering model environment.

Aims of research

This research topic serves investigation and definition system level parameter optimization including systems engineering background, system behaviors, algorithms, and mathematical methods. Results are awaited to provide better understand system level parameter optimization.

Research task

Analyze system behaviors and related parameters. Reveal relevant existing research results and define plan of own research work. Study the modeling capabilities in 3DExperience platform for the relevant roles (See: "Laboratory software" below). Propose method for tuning systems parameters considering multiple criteria and multiple cases. As new own contribution, develop system parameters optimizing algorithms and related procedures to improve the overall system behavior. Define mathematical optimization criteria using simulation results in accordance with the own research plan. Develop experimental engineering model which is appropriate for verification the above results using capabilities available in the 3DExperience.

Benefits at application of the awaited research results

Research in this topic is motivated by industrial problem solving related research capabilities available at the 3DExperience platform. In this way, results can be validated in industrially eligible model and they are potentially suitable for industrial problem solving. At the same time, this means joining to the recent trend for integration of theory and practice.

Laboratory software

Modeling capabilities are available for this student research at the Laboratory of Intelligent Engineering Systems in the 3DExperience platform from cloud for the relevant researcher roles below. Basic modeling capabilities are also available for the development of the experimental engineering model in integration with role related capabilities.

Dynamic Systems Designer (SDY) for the modeling, simulation and validating engineering systems immersed in model-based systems engineering. Compliant with the open Modelica language and includes domain specific Modelica libraries for modeling and simulation of multi-body and multi-physic systems.

Systems Behavior Optimization (DOY) to optimize and tune systems parameters of a device or its controller for multiple criteria and multiple cases.

Systems Simulink Export (XSK) serves export Modelica compliant systems behavior models from the 3DEXPERIENCE® Platform for simulation within a Simulink environment.

Literature

Recent actual and time-honored classical publications about relevant research results should be surveyed. The planned research should be placed in former published results of others to prove its novelty.