Representation of flexible bodies and function driven organic shapes

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About the topic

Topic contextually connects two recent research areas in the scope of contextual shape modeling. One is mathematical modeling and simulation of physical system that includes both rigid elements and flexible structures. Other is modeling of function-driven organic shapes. Geometrical and physical properties of a general flexible bodies model are generated using finite element analysis and are undergone dynamical analyses. Organic shapes require modeling which is different from modeling of geometric shapes. Research establishes contextual connection of mathematical, functional, and behavioral modeling and simulation.

Aims of research

This research serves investigation and definition inside and outside contexts of flexible body and function driven organic shape representations then elaboration new mathematical and behavior models. Results are awaited to provide better understand of contextual model for engineering structures which include flexible bodies and function driven organic shapes.

Research task

Analyze behaviors and contexts of flexible bodies and function driven organic shapes. Reveal relevant existing research results and define plan of own research work. Study the modeling capabilities in the 3DExperience platform for the relevant roles (See: “Laboratory software” below). Propose new contextual connections and related models. As new own contribution, develop driving contextual connections, mathematical models, behavior representations, and related virtual processes 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.

Flexible Bodies Library (FBZ) is based on Modelica language to establish direct connection with model developed in 3DExperience.

Function Driven Generative Designer (GDE) to explore and generate organic shapes using functional specification.

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