

A study of integration framework for co-simulation with optimization design and multi-body dynamics

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Abstract

Dynamic analysis of mechanical systems using computers is rapidly performed though the growth of computing power. A simulation-based design (SBD) is a useful technique in otherwise impossible cases, which is verified by using an experiment with a model. The simulation technique is an excellent means of understanding qualitative or quantitative optimization design, and can skip the process of test model production, which is costly and time-consuming.

In 2014, the optimization design of a complex model as figure 1 had been studied using SBD with multi-body dynamic. The used optimization design method was genetic algorithm (GA). Then, we have failed this study due to a difficult problem about feedback simulation. States of function, constraints, variables and etc. for the optimization design are steady and static, but simulation results for design reference have unstable and dynamic state. Therefore, a connection framework is developed to tackle this problem. This framework is called “integration framework” or “software framework”.

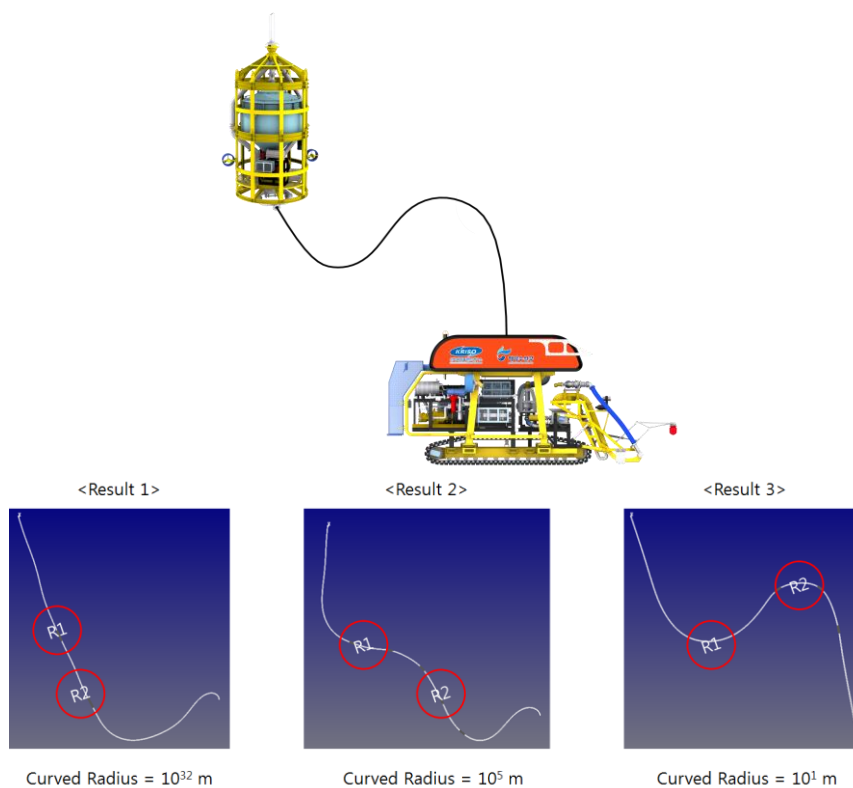


Figure 1: The research results of the SBD for complex model in 2014[1].

In this study, we have developed the framework using RCE[2, 3] and DAFUL[4] as figure 2. RCE(Remote Component Environment), which had been developed DLR (German Aerospace Center),

is an open source software to help engineers, scientists and others to create, manage and execute complex calculation and simulation workflows. DAFUL, which had been developed in KOREA, is commercial software for multi-body dynamic analysis. We have solved the some example problem for verification and re-solved the optimization design problem using the developed framework, and the results will be discussed though this presentation.

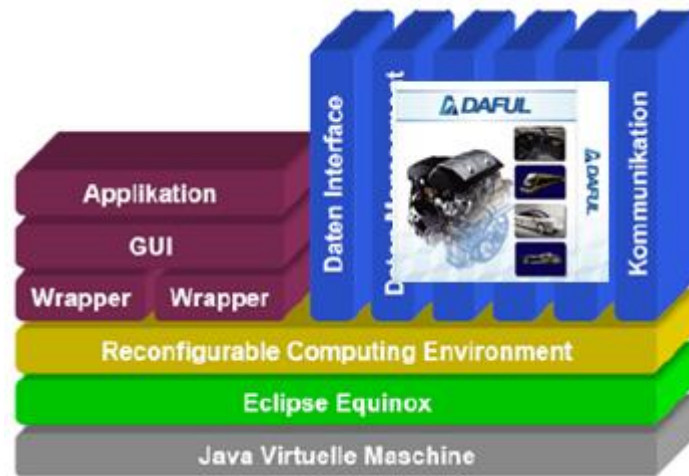


Figure 2: The conceptual diagram for integration framework.

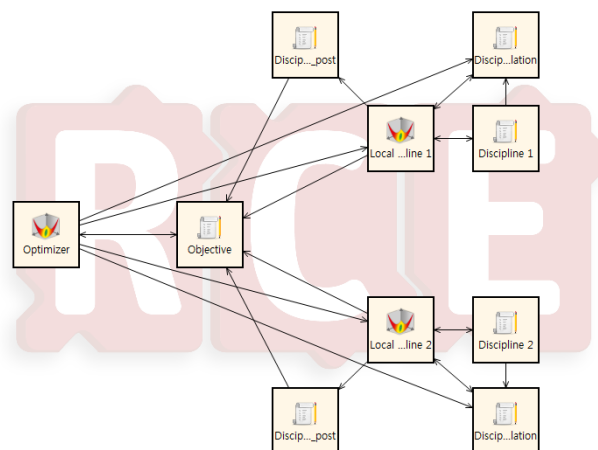


Figure 3: Example model for the optimization design using RCE with MBD.

References

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