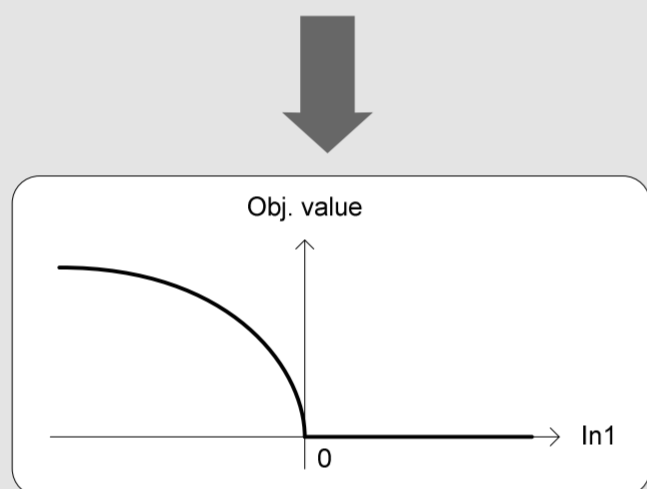
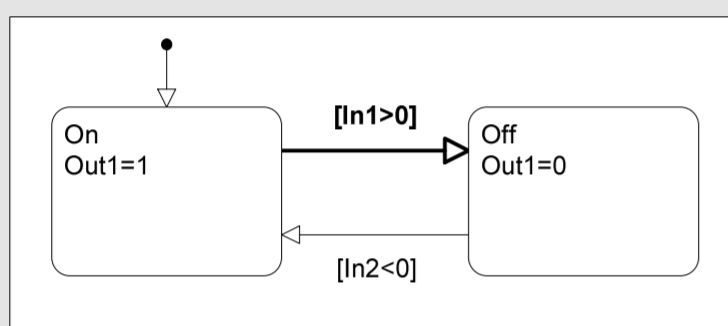


Search-Based Testing of Complex Simulink Models containing Stateflow Diagrams

Evolutionary structural testing is an approach to generate test cases automatically that achieve high structural code coverage and has been established for being used on the code level, but so far only little work has been done to apply it to system models, such as MATLAB/SIMULINK/STATEFLOW models. The position taken in the research summarized here is that structural testing of real-world SIMULINK models containing STATEFLOW charts is possible. Ideas for necessary problem solutions are proposed.

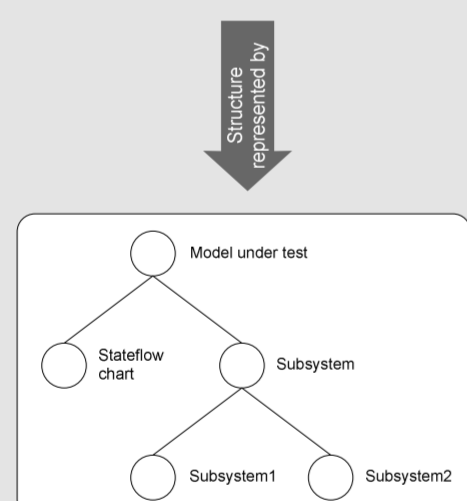
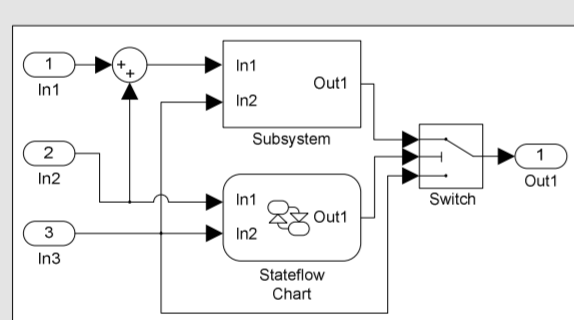
Challenge 1 : Coverage of Structural Elements



The principles of white box structural testing of procedural code may also be applicable to generate input covering the structural elements of SIMULINK models and STATEFLOW diagrams.

An objective function is constructed for each test goal which guides the evolutionary input signal generator to identify input that triggers for example transitions of a STATEFLOW diagram so as to eventually achieve the test goal.

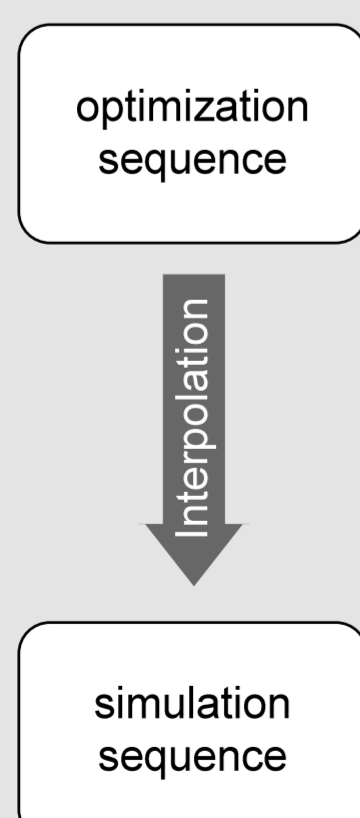
Challenge 2 : Dealing with Complexity



The complexity of the model under test has a big influence on the success of the test due to increasing execution times. Therefore, sub models of the model should be optimized separately by taking into account hierarchical structures, such as *subsystems*.

If the model is not structured already, complexity measures can be used to create reasonable sub systems in various ways.

Challenge 3 : Signal Generation



Due to the size of the inputs to be optimized when using continuous signals, a differentiation between optimization and simulation sequences needs to be accomplished.

The optimization sequence consists of only a small number of parameters to be used for the optimization engine and to be transformed into a simulation sequence by interpolation.