

General fault triggering architecture to trigger model faults in Modelica using a standardized blockset

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Adding faults to Modelica models can be done in many different ways and is not standardized in any way. To support the standardization of Fault modeling in Modelica, a set of blocks is presented using valid Modelica code which are used as sources for Faults.

The proposed method support the injection of parameter faults (constant during simulation time) as well as variable faults. Special care has been taken that in absence of a block to control the faults, the default values (no fault) are used.

A trade of study between multiple fault injection options is made. Based on the results of this study, a broadcasting mechanism based on the inner-outer system is selected to control the faults. This minimizes user interaction during model building and does not need any non-physical connections. Also upgrading system components with extra faults does not need any model redesign. Using the abstract syntax tree (AST) functionality of the Dymola ModelManagement library, the model is analyzed and all faults in the model and its sub models are found. Using the automatically generated wrapper library, it is possible to conveniently control all faults in the model.

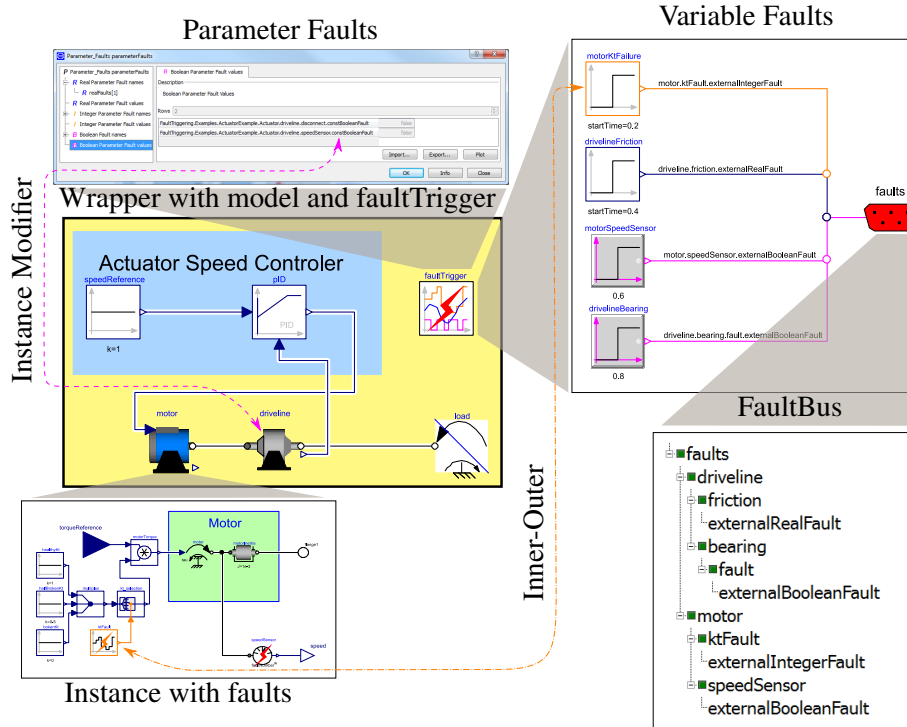


Figure 1: Automatically generated wrapper model (yellow) which contains the extended original model and the block `faultTrigger`. In this block all parameter and variable faults can be set. The parameter faults communicate directly with the model instances using instance modifiers (pink dash-dotted line), the variable faults using a bus system connected to a global inner/ outer system (orange dashed line).