Analysis and Optimization of Simulink Models

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The Simulink modelling tool is used to diagram and study cyber-physical systems, and to generate embeddable code directly from the models. Therefore, optimization of this model (and resulting code) is important for simulation/executing performance.

Current Simulink Optimization Issues:
- May occur during code generation
- Not explicit
- Lack of traceability/verification
Defining explicit analyses on Simulink models
- Data-flow/range analyses, block nesting

Implementing model transformations to optimize the model based on these analyses
- Explicit transformations can be debugged/traced/verified
- Produces model for further verification/development
Constant Folding

Model before

Model after

Dead-Block Removal

Model before

Model after
Material presented is found in:


Future work:

- Expand analyses to consider user assumptions, numerical precision issues
- Implement tool to perform dynamic analysis of Simulink models
- Formally verify each model transformation