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**Automatic Verification of Behavior Preservation
at the Transformation Level
for Relational Model Transformation**

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The correctness of model transformations is a crucial element for model-driven engineering of high quality software. In particular, behavior preservation is the most important correctness property avoiding the introduction of semantic errors during the model-driven engineering process. Behavior preservation verification techniques either show that specific properties are preserved, or more generally and complex, they show some kind of behavioral equivalence or refinement between source and target model of the transformation. Both kinds of behavior preservation verification goals have been presented with automatic tool support for the instance level, i.e. for a given source and target model specified by the model transformation. However, up until now there is no automatic verification approach available at the transformation level, i.e. for all source and target models specified by the model transformation.

In this report, we extend our results presented in [27] and outline a new sophisticated approach for the automatic verification of behavior preservation captured by bisimulation resp. simulation for model transformations specified by triple graph grammars and semantic definitions given by graph transformation rules. In particular, we show that the behavior preservation problem can be reduced to invariant checking for graph transformation and that the resulting checking problem can be addressed by our own invariant checker even for a complex example where a sequence chart is transformed into communicating automata. We further discuss today's limitations of invariant checking for graph transformation and motivate further lines of future work in this direction.

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