
A qualitative pilot for complex systems simulation

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Résumé

Hybrid systems are complex systems that use discrete and continuous variables, combining several different working modes. There are currently many quantitative methods allowing verification and prediction of such systems. However, they can rapidly become very consuming, especially when the system is not entirely known or when one does not know what to seek. It could be relevant for simplified model checking and prediction to bring the model to a higher level of abstraction to avoid slow and expensive computation and deal with coarse approximations of the system's behavior. This unprecise result may allow us to locate areas of interest or danger in the model and give a direction for a quantitative and more precise simulation adapted to our needs. Some searches have been achieved to simplify this modeling using qualitative reasoning. But although they gave results on dynamic or static systems, they found limits with mixed ones. Moreover, I found no proposition of making the two models communicate. This thesis aims to unify the different qualitative abstraction theories into something more general to create a qualitative pilot that could predict and supervise the execution and simulation of quantitative models.

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