

Comparison for State Event Handling in Hybrid Dynamical Systems

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Abstract. This Paper deals with state events of hybrid dynamical systems and their handling. The influence of the aspects of the implementation in the simulation environment to derive the mathematical description has to be considered also regarding the handling of state events.

One point of view is the algorithmic point which means to implement the handling of state events of a certain model via the simulation algorithm. The other way would be to adapt the model in this way that the handling of the event can be done more easily. These considerations are related to the relationship between the abstract mathematical model and the implementation in a simulation environment, the so called simulation model. The influence of the aspects of the implementation in the simulation environment to derive the mathematical description has to be considered also regarding the handling of state events.

The mathematical characterization offers a field of simplifications in the description of the model. In the phase of the computation of the mathematical description of the model for the system the definition of state space, formulation of the derivatives etc. fix the complexity of the description.

Finally one suitable example to investigate an adaptation of model structure is an oscillation circuit with a diode which will be presented as a benchmark. This system allows showing an academic example of the abstract mathematical formulation in the field of Electrical Engineering. A diode is a nonlinear component which forces the connected circuit to a hybrid system behavior. The character of the diode can be described via a switched behavior or via a continue function. It will be shown that the choice of the model for the diode results in a completely different structure of the hybrid model.

Keywords: Hybrid Dynamical Systems, State Event Handling, Comparison, Benchmarks