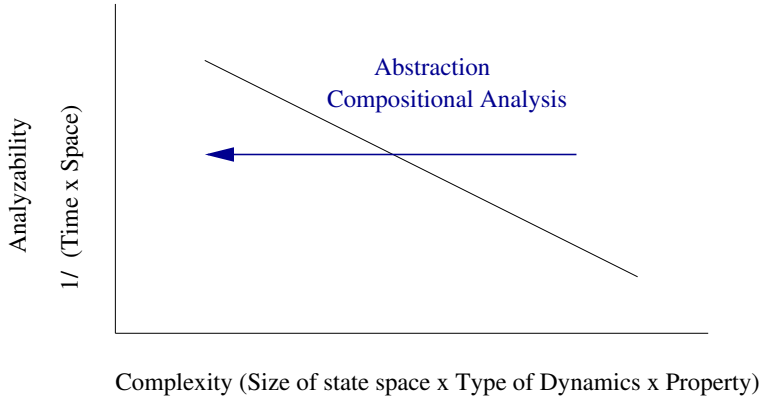
Relational Abstraction: A new abstraction concept

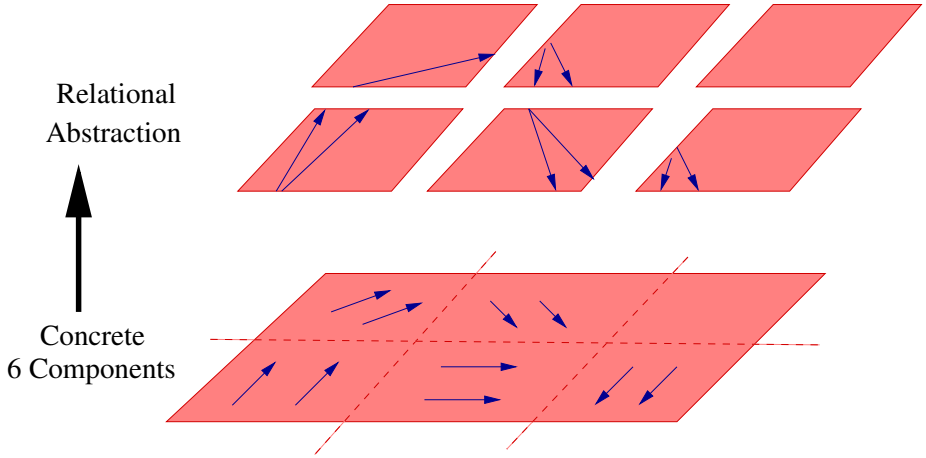
Benefit: Enables analyzability of complex systems



Feature: Compositional analysis: Abstracts open components with hybrid dynamics

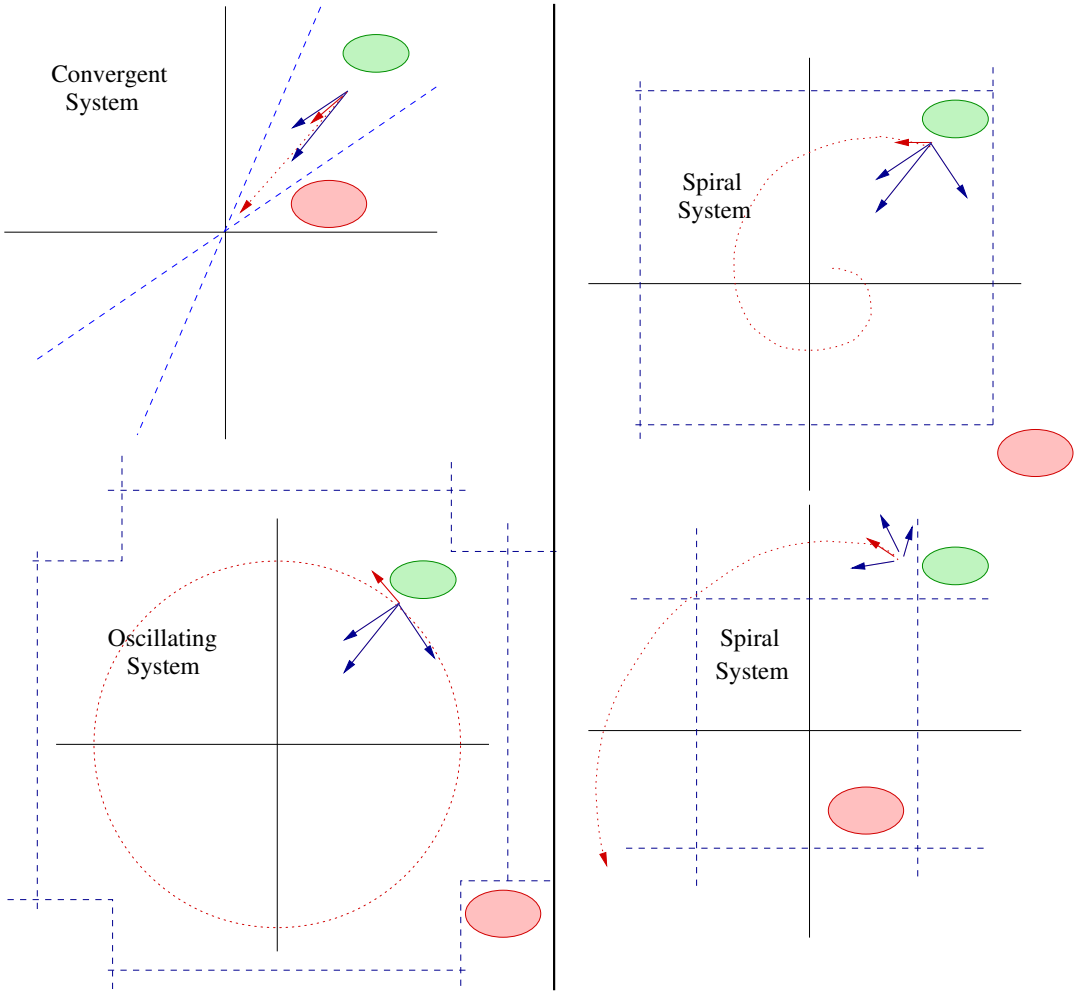
Feature: Compatible with other abstraction and model checking techniques

Novelty: Abstracts the transition relation, not the state space



Scope: Applies to all dynamical systems. Effective relational abstractions can be computed for several classes.

Relational Abstraction: Examples



Class	$\frac{d\vec{x}}{dt}$	RelAbs
Timed System	$\dot{x} = 1,$ $\dot{y} = 1$	$x' - x =$ $y' - y$
Multirate System	$\dot{x} = 2,$ $\dot{y} = 3$	$\frac{x'-x}{2} =$ $\frac{y'-y}{3}$
Linear Hybrid System	$\dot{\vec{x}} = A\vec{x}$	$(0 \leq p' \leq p$
...	...	...

On Hybrid System benchmarks, verification time reduces from 10 hours to a few minutes (100x improvement).