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Discrete Bifurcation Analysis of Reactive Systems

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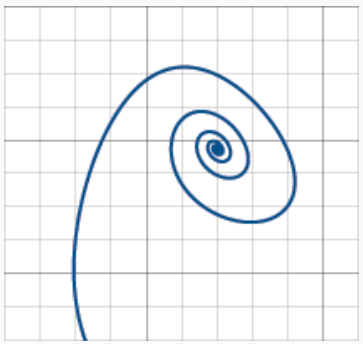
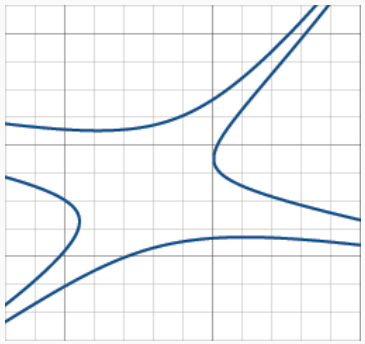
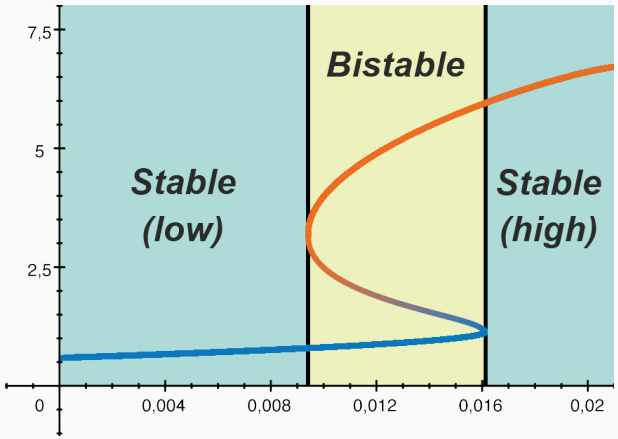
Discrete Bifurcation Analysis of Reactive Systems

- **Bifurcation Analysis:** *Qualitatively* classify system's behaviour with respect to parameters $\rightarrow$ **bifurcation points**.
- Behaviour can be described in terms of phase portraits, or **patterns**.



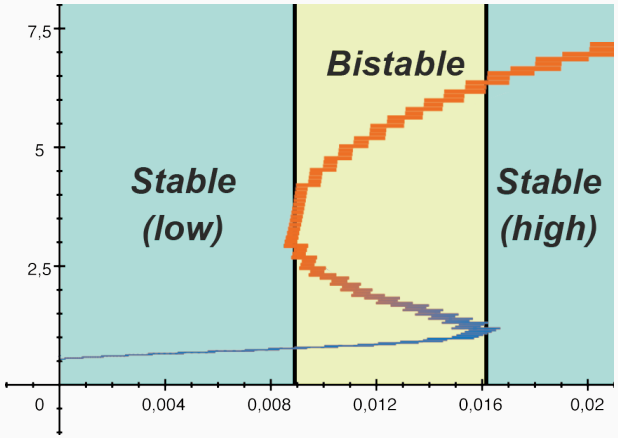




State-of-the-art bifurcation analysis techniques are hard to automate and scale poorly in the number of parameters.

Discrete Bifurcation Analysis of Reactive Systems

- Pattern can be described in terms of **temporal logics** on a general parametrised transition system.
- $HUCTL_P$ with hybrid, directional and backward operators as pattern specification language.
- Implemented in an open-source tool PITHYA.



cycle State x lies on a cycle (not necessarily stable).

[**bind** x: **EX EF** x]

stable State x lies in a stable component.

[**bind** x: **AG EF** x]