

# Continuous Limit in Dynamics with Choice

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We are interested in time evolution of systems that can and do switch their modes (regimes) of operation at discrete moments of time. The intervals between switching may, in general, vary. The number of modes (regimes) may be finite or infinite. Such systems are very common in life. Every living organism is like that. In papers [1], [2], [3] we have developed a theory that models such systems and call it dynamics with choice (DWC). We have studied the long term behavior and, in particular, the existence and properties of global compact attractors in DWC. In this paper, we define and study a continuous time dynamics whose trajectories are limits of trajectories of discrete DWC as time step goes to zero. Under certain conditions we are able to prove the semi-group property for the continuous limit, and we study such semi-dynamical systems. In a special case of a switched system, i.e., when the DWC is generated by switching between solutions of a finite number of systems of ODEs, we show that the reachable set in the continuous limit DWC coincides with the reachable set of a certain differential inclusion.

## References

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- [3] Kapitanski, L.; Gonzalez Živanovic, S.: *Variable time step dynamics with choice*. Proceedings of the International Conference on Information and Communication Technologies and Applications (2011) 50-55.