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Topological-Computational Methods for Analyzing Global Dynamics and Bifurcations

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In [1], a topology-based computational method for analysing global dynamics and bifurcations was proposed and applied to a two-parameter family of two-dimensional iterated maps which models population dynamics with age classes. In this talk, I will show more examples of application of the method for various different types of dynamical systems, such as a chaotic dynamics in globally coupled logistic maps, associative memory models of the Hopfield type, and so on. I will also discuss how the method can be applied to an ODE system, and how one can detect bifurcations of dynamical systems by this method.

This talk is based on joints works with: T. Aoyagi (Kyoto), Z. Arai (Hokkaido), M. Gameiro (San Carlos), K. Mischaikow (Rutgers), M. Nomura (Kyoto), I. Obayashi (Kyoto), H. Oka (Ryukoku), P. Pilarczyk (Braga).

References

- [1] Z. Arai, W. Kalies, H. Kokubu, K. Mischaikow, H. Oka, and P. Pilarczyk, A database schema for the analysis of global dynamics of multiparameter systems, *SIAM J. Applied Dynamical Systems*, 8 (2009), 757-789.