A UNIVERSAL CLASSIFICATION AND ADAPTIVE DYNAMICS FOR DISCRETE-TIME COMPETITIVE SYSTEMS VIA THE CARRYING SIMPLEX

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We study the permanence and impermanence for discrete-time Kolmogorov systemsadmitting a carrying simplex. Sufficient conditions to guarantee permanence and impermanence are provided based on the existence of a carrying simplex. Particularly, for low-dimensional systems, permanence and impermanence can be determined by boundary fixed points. For a class of competitive systems whose fixed points are determined by linear equations, there always exists a carrying simplex. We provide a universal classification via the equivalence relation relative to local dynamiof boundary fixed points for the three-dimensional systems by the index formula on the carrying simplex. The theoretical results are applied to concrete models such as the Leslie-Gower, Atkinson-Allen and Ricker models. For these models we investigate in partiucular when invasion into a dimorphic population is possible.

The talk is based on joint work with Jifa Jiang, Lei Niu and Ping Yan.

References

[1] Gyllenberg, M., Jiang, J., Niu, L. and Yan, P.: On the classification of generalized competitive Atkinson-Allen models via the dynamics on the boundary of the carrying simplex, Discrete Contin. Dyn. Syst., in the press.