

# Intra-specific competition enhances stable coexistence in a periodic model for biotic interactions

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**Abstract:** This work addresses the interaction between two species through the use of a new model in population dynamics (presented in [?]) in which continuous mutualism-antagonism is shown to be a key property of most pairwise interactions and is originates from the varying roles played by the interacting partners.

This model is based on the assumption that the distribution of individual interaction events includes both negative and positive immediate outcomes, with variable frequencies, for at least one of the interacting species. Here, the parameter  $P_i$  is the proportion of interaction events where the immediate outcomes for the individuals of the species  $i$  are positive either because the individuals interacting are source or is provided with a service.

What distinguishes our study from the original system is the periodic dependence in time of the coefficients  $P_i$  in the equations. Whose main objective will be to establish the existence of periodic solutions of positive components (state of coexistence) for this system.

**Keywords:** Population Dynamics. Periodic Dynamical Systems. Coexistence State. Mutualism-Antagonism Continuum. Transcritical Bifurcation. Cusp Bifurcation.

## References

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