Geometric methods for global stability in the Ricker competition model

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It is an important problem to determine when local conditions can be globally verified. In [2] and [3], the authors investigated the local stability of the equilibrium points of the logistic competition model and the Ricker competition model, respectively. It was shown that the coexistence equilibrium point of the Ricker competition model is locally asymptotically stable if the parameters lie in a certain stability region in the parameter space.

Later in [1] it was conjectured that the coexistence (positive) equilibrium is indeed globally asymptotically stable in the hypotheses above. In this talk, we will discuss the geometric and topological tools that allow us to completely describe the geometry of the image of the Ricker map. We will use singularity theory to describe the relative position of the images of the critical curves and, using methods from covering space theory, we will describe the regions where the cardinality of the pre-images of points are constant. Finally we will describe how these methods are used to show global stability.

References

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