Chaos Control Dynamics in Competitive Herbivore Species Network

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ABSTRACT

This paper studies the mathematical modelling of a competitive ecological system in which the interactions between different species are being studied in the framework of ecological systems. Both linear and non-linear interactions have been accounted in the model. Through fixed point analysis, the critical value of parameter has been evaluated after which the system enters critical phase from phase of stability and then to chaos. Bifurcation plot for variation in coefficient of indirect dependency is plotted and used to verify the different phases of evolution of the interspecies relation. The system dynamics is observed to transit from stable to chaotic state through state of critical stability. To control chaos in the competitive ecological system under master slave scheme, it is synchronized to another stable identical ecosystem. Using Lyapunov stability theorem controller are devised. The active controller is observed to completely control the chaos in the system and restore stability of the ecological system.

KEY WORDS: Competitive Species interaction, Bifurcation, Lyapunov function, Active Controller, Chaos.