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A Predator-Prey System with Herd Behaviour and Strong Allee Effect

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Abstract: In this paper, we have studied the dynamical behaviours of a predator-prey system. The prey exhibits herd behaviour, and is also subject to strong Allee effect. Positivity and boundedness of the system are discussed. Some criteria for the extinction of prey and predator populations are derived. Stability analysis of the equilibrium points is presented. A criterion for Hopf bifurcation is derived. Numerical simulations are carried out to validate our analytical findings. Implications of our analytical and numerical findings are discussed critically.

Keywords: *Prey-predator system; Allee effect; stability; Hopf bifurcation.*

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1 Introduction

It is a fact that species does not survive alone. Individuals of one species are usually biologically associated to members of other. Their interactions take several forms, depending on whether the influences are beneficial or detrimental. Among these interactions, predator-prey relationship is considered to be an extremely important one. It is true that the preys always try to develop the methods of evasion to avoid being eaten. However, it is certainly not true that a predator-prey relationship is always harmful for the preys,

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