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DYNAMICAL ANALYSIS OF PREY REFUGES IN A PREDATOR-PREY SYSTEM WITH IVLEV FUNCTIONAL RESPONSE

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Abstract. In this paper, we have considered a predator-prey system incorporating Ivlev functional response and prey refuges. Our results show that refuges used by prey have stabilizing effect on the considered system, and also can increase the equilibrium density of prey population. The existence of limit cycles and the global stability of the interior equilibrium point also have been studied.

Keywords. Predator-prey system; Ivlev functional response; Prey refuge; Limit cycle; Stabilizing effect.

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1 Introduction

The problem of dynamics of a predator-prey system with a given functional response has been studied in many articles [1-13]. Most of them has considered the stability properties and the existence and/or uniqueness of limit cycle. At a comparatively smaller extent, the hiding behavior of prey, which can be applied to maximize their fitness measured by instantaneous per capita growth rate, has been incorporated as a new ingredient of predator-prey systems and its major effects on the community stability have been studied. Most of theoretical work on population dynamics of refuges lead to the conclusion that refuges used by prey have a stabilizing effect on the considered systems [14-23].

The traditional ways in which the effects of refuges used by prey have been incorporated in predator-prey systems are to consider two types of refuges: those that protect a constant proportion and those that protect a constant number of prey. The consequences of refuge type for stability of predator-prey systems depend on the underlying system, but the general conclusion