

Global boundedness and asymptotics of a class of prey-taxis models with singular response

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Abstract

This paper is concerned with a class of singular prey-taxis models in a smooth bounded domain under homogeneous Neumann boundary conditions. The main challenge of analysis is the possible singularity as the prey density vanishes. Employing the technique of a priori assumption, the comparison principle of differential equations and semigroup estimates, we show that the singularity can be precluded if the intrinsic growth rate of prey is suitably large and hence obtain the existence of global classical bounded solutions. Moreover, the global stability of co-existence and prey-only steady states with convergence rates is established by the method of Lyapunov functionals.

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