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Attraction-Repulsion Taxis Mechanisms in a Predator-Prey Model

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Attraction-Repulsion Taxis Mechanisms in a Predator-Prey Model

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We consider a predator-prey model where the predator population favors the prey through biased diffusion toward the prey density, while the prey population employs a chemical repulsive mechanism. This leads to a quasilinear parabolic system. We first establish the global existence of positive solutions. Thereafter we show the existence of nontrivial steady state solutions via bifurcation theory, then we discuss the stability of these branch solutions. Through numerical simulation we analyze the nature of patterns formed and interpret results in terms of the survival and distribution of the two populations.