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A road-field population model with climate change: forced wave patterns and stability

Recently, increasing attention is being devoted to spatial invasion and wave propagation phenomena in high-dimensional heterogeneous media (such as road-field interchange networks), due to their significance in applications to population models. The combined effects of road diffusion and climate change in an unbounded high-dimensional domain introduce further complexity and challenges. In this talk, we study the propagation dynamics of a road-field system in a shifting environment. Our results indicated that forced traveling waves exist as long as the shifting speed is less than a critical value. For each of these kind of speeds, the forced wave profile is unique and exponentially stable. While the shifting speed is greater than that critical value, we further established propagation dynamics in connection to extinction and persistence. We found that the propagation of persistence cannot be faster than the critical speed.