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*Determinacy of the Single Spreading Speed or Multiple Spreading Speeds for a Cooperative Lotka-Volterra System*

Cooperation in population systems can result in the existence of a co-existence (win-win) equilibrium. When diffusion is incorporated, individual species possibly invade into the far end with different spreading speeds. Predicting or determining them (including the fast and slow spreading speeds) becomes challenging. This talk is devoted to the determinacy of invasion speed of each species for a cooperative Lotka-Volterra system, which admits single or multiple spreading speeds (co-speed or fast-slow speed). In the existence of a single spreading speed, the two species share a common invasion speed, and nonnegative traveling wave profiles, connecting the extinction equilibrium, exist, if the wave speed is not less than the common speed. Predicting or determining the invasion speed can be linked to the linearized system at the extinction state. The existence of multiple spreading speeds indicates new connections of traveling wave profiles into certain intermediate states. Due to this, the determinacy of each spreading speed focuses not only on the extinction states but also on the corresponding intermediate states. Based on constructions of upper-lower solutions, we establish criteria that can determine the fast-slow invasive speeds. Our speed selection mechanism can also help scientists greatly understand the movement of stacked fronts in cooperative systems with multiple species.