

Classification of the spreading behaviors of a two-species diffusion-competition system with free boundaries

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Abstract

In this talk, we revisit the spreading behavior of two invasive species modeled by a diffusion-competition system with two free boundaries in a radially symmetric setting, where the reaction terms depict a weak-strong competition scenario. Numerical simulations suggested that for all possible initial states, only four different types of long-time dynamical behaviors can be observed: (1) chase-and-run coexistence, (2) vanishing of u with v spreading successfully, (3) vanishing of v with u spreading successfully, and (4) vanishing of both species. Here we rigorously prove that, as the initial states vary, there are exactly five types of long-time dynamical behaviors: apart from the four mentioned above, there exists a fifth case, where both species spread successfully and their spreading fronts are kept within a finite distance of each other all the time. This talk is joint work with Professor Yihong Du.