

EFFECTS OF SMALL SPATIAL VARIATION OF THE REPRODUCTION RATE IN A TWO SPECIES COMPETITION MODEL

GEORG HETZER, TUNG NGUYEN, WENXIAN SHEN*

ABSTRACT. Of concern is the effect of a small spatially inhomogeneous perturbation of the reproduction rate of the first species in a two-species Lotka-Volterra competition-diffusion problem with spatially homogeneous reaction terms. Apart from this perturbation, the two species are assumed to be identical. Our main result shows that the first species can always invade, whereas the second species can only invade under certain conditions which yield uniform persistence of both species. The proof relies on comparison techniques and properties of the principal eigenvalue of reaction-diffusion equations.

GEORG HETZER

DEPARTMENT OF MATHEMATICS AND STATISTICS, AUBURN UNIVERSITY, AUBURN, AL 36849

E-mail address: hetzege@auburn.edu

TUNG NGUYEN

DEPARTMENT OF MATHEMATICAL SCIENCES, UNIVERSITY OF ILLINOIS AT SPRINGFIELD, SPRINGFIELD, IL 62703

E-mail address: tnGuy2@uis.edu

WENXIAN SHEN

DEPARTMENT OF MATHEMATICS AND STATISTICS, AUBURN UNIVERSITY, AUBURN, AL 36849

E-mail address: wenixsh@auburn.edu

1991 *Mathematics Subject Classification.* 35K57.

Key words and phrases. Lotka-Volterra two-species competition-diffusion system; nearly identical species; invasion; uniform persistence.

*The third author is partially supported by NSF grant DMS-0907752.