ADRIAN LAM, The Ohio State University

Asymptotic spreading of KPP reactive fronts in heterogeneous shifting environments

We study the asymptotic spreading of Kolmogorov-Petrovsky-Piskunov (KPP) fronts in heterogeneous shifting habitats, with any number of shifting speeds, by further developing the method based on the theory of viscosity solutions of Hamilton-Jacobi equations. Our framework addresses both reaction-diffusion equation and integro-differential equations with a distributed time-delay. The latter leads to a class of limiting equations of Hamilton-Jacobi-type depending on the variable $s = x/t$ and in which the time and space derivatives are coupled together. We will first establish uniqueness results for these Hamilton-Jacobi equations using elementary arguments, and then characterize the spreading speed in terms of a reduced equation on a one-dimensional domain in the variable $s = x/t$. In terms of the standard Fisher-KPP equation, our results lead to a new class of "asymptotically homogeneous" environments which share the same spreading speed with the corresponding homogeneous environments. This is joint work with Xiao Yu of South China Normal University.